CHAPTER 4

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND ENVIRONMENTAL COMMITMENTS

4.1 INTRODUCTION

This section describes the affected environment and the environmental consequences, including cumulative effects, associated with renewing the long-term water service contracts for the Shasta and Trinity River Divisions under Alternatives 1 and 2 compared to the No Action Alternative.

This document organizes required information by environmental resources. Each resource section describes the affected environment and the environmental consequences associated with renewing the long-term water service contracts under Alternatives 1 and 2 as compared to renewing the long-term water service contracts under the No Action Alternative.

CONTRACT SERVICE AREA DESCRIPTION

The Shasta and Trinity River Divisions consist of the BVWD, CCCSD, City of Redding (Buckeye Area), City of Shasta Lake, SCSD, SCWA, CCSD, and three other smaller contractor service areas, KCSA, MGCSD, and USFS Centimudi Boat Ramp. Table 4.1-1 describes features of each long-term water service contractor within the Shasta and Trinity River Divisions, and Figure 1-2 shows the approximate service boundaries of the long term water service contractors.

The Shasta and Trinity River Divisions are located entirely within Shasta County and fall primarily within the Redding Basin, Drainage Area Units (DAUs) 141 and 143, with minor areas in outlying DAUs 136 and 145. Water is supplied for irrigation, domestic, industrial, commercial, or recreational uses, or a combination of these uses. The location, history, service area, and water supply sources of each major long-term water service contractor are described in this section. As shown on Table 4.1-1, the major long-term water service contractors are BVWD and CCCSD. BVWD and CCCSD account for 72 percent of all CVP water delivered to long-term water service contractors in the Shasta and Trinity River Divisions. The discussions in the following sections address the major water service contractors in the Shasta and Trinity River Divisions.

RESOURCES CONSIDERED

The resources and issues analyzed in this EIS were identified through a review of NEPA guidance documents, and through the scoping process. The resources and issues described in this chapter are as follows.

- Water Supplies and Facilities Operations
- Socioeconomics
- Land Use

- Biological Resources
- Environmental Justice
- Indian Trust Assets
- Cultural Resources

This EA does not analyze resources for which it would be reasonable to assume that substantial or significant impacts could not occur. Specifically, potential effects to water quality, recreation, air quality, soils, visual resources, transportation, noise, hazards and hazardous material, public services, non-water utilities, and service systems and secondary growth impacts are not analyzed because they were not identified as significant issues during scoping and it would not be reasonable to assume that renewing the long-term water service contracts could result in substantial impact to these resources or services.

TABLE 4.1-1
FEATURES OF SHASTA AND TRINITY RIVER DIVISIONS LONG-TERM SERVICE CONTRACTORS (1999)

Contractor Name	Shasta or Trinity River Division	Contract Number	Maximum Water Quantity of CVP Long Term Contract Water (Acre-Feet)	Note	% of the Division's Maximum Water Quantity	Reclamation M&I Rate Assigned	Reclamation Ag Rate Assigned	Service Boundary Area (Acres)	Total Connections (3)		Pre-CVPIA Expiration
									M&I	Ag	
Bella Vista Water District	T	851A~~I~~1R~~3~~9	**24,000**		42.33%	x	x	~~3,395~~33,932	4538	615	2/29/2000
Centerville Community Services District	T	14062003367A~~X~~	**2,900**	(1)	5.11%	x	o	nav	1155	0	12/31/2004
City of Redding	S	5272A	**6,140**	(2)	10.83%	x	o				
Spring Creek Conduit (Buckeye)	S	5272A	Included			-	-	17,220	4,179	0	12/31/2009
Sacramento River (Buckeye)	S	5272A	Included			-	-	Included	-	0	12/31/2009
Toyon Pipeline (Buckeye)	S	5272A	Included			-	-	640	58	0	12/31/2009
City of Shasta Lake	S	W1134~~I~~1R4~~1~~0	~~**2750**~~ **4,400**		7.76%	x	o	7,785	3,773	0	2/29/2000
~~Shasta Dam Area PUD~~		~~nav~~	Included			-	-		-	-	
~~Summit City PUD~~		~~nav~~	Included			-	-		-	-	
Clear Creek Community Services District	T	489A~~I~~1R~~3~~9	**15,300**		26.98%	x	x	14,314	1,707	784	2/29/2000
Shasta Community Services District	T	862A	**1,000**		1.76%	x	o	6,400	717	0	12/31/2003
Shasta County Water Agency	S	3367A	**2,100**	(3)	3.70%	x	o	nav	nav	0	12/31/2004
Others			860								
Keswick County Service Area	T	1307A	**500**		0.88%	x	o	5,500	191	0	12/31/2009
Mountain Gate Community Services District	S	6998	**350**		0.62%	x	o	4,160	650	0	12/31/2003
USFS (Centimudi Boat Ramp)	S	3464A	**10**	(4)	0.02%	x	o	nav	nav	0	Indefinite
Total			**55,050**		99.99%			56,019			

NOTES
(1) New interim contract in 2001 for 2,900 acre-feet.
(2) City has 6,140 acre-feet under CVP Buckeye Contract.
(3) SCWA principally subcontracts CVP water to others; agricultural water not used since 1983.
(4) Information provided by contractor on September 20, 2000
nav = information not available

4.2 WATER SUPPLIES AND FACILITIES OPERATIONS

4.2.1 DESCRIPTION OF EXISTING SHASTA AND TRINITY RIVER DIVISIONS AND FACILITIES

Bella Vista Water District

The BVWD is located generally east of the City of Redding and south of Shasta Lake. BVWD is bounded on the south generally by State Highway 44 and extends east to slightly beyond Little Cow Creek. This area also includes an overlapping eastern part of the City of Redding and the rural communities of Bella Vista and Palo Cedro. The district currently has 4,538 residential connections and 615 agricultural connections.

BVWD is a publicly owned water agency formed in ~~1964~~1957 under California Water Code Division 13, Sections 34000 through 38501. The district was formed to serve agricultural irrigation demands, which still represent 70 to 80 percent of the district's water demand. However, most of the service connections are now either domestic or rural residential.

Urban uses predominate within the southeast corner of the district where sewage disposal facilities are available. Residential uses, with lot sizes between 1 and 5 acres, are dispersed across the rest of the district. Agricultural uses are almost exclusively confined to the fertile soil along Stillwater Creek and Cow Creek. Pasture represents the bulk of the agricultural uses, but there is a broad array of other crops as well. The most significant industrial use is a large catfish farm.

BVWD's primary water source is the Sacramento River. Diversion of the ~~appropriated~~ water is authorized from the Cow Creek Unit of the Trinity River ~~Project~~ Division, which is part of the CVP. This source allows for up to 24,000 acre-feet per year from BVWD's original contract and 578.7 acre-feet per year of CVP water purchased through the Shasta County Water Agency. (That 578.7 acre-feet is being assigned to BVWD by the SCWA). Both of these allotments are subject to reduction during dry years. In the very severe drought years of 1991 and 1992, the reduction was 25 percent of the water used for M&I uses and 75 percent of the water for agricultural uses. Available surface water was supplemented with groundwater from wells located near the southern boundary of the district. These reductions in supply caused severe drought restrictions to be imposed, which have had a continuing impact on district water sales. The supplementary water provided by the wells constitutes about 10 percent of the supply normally available from the river and about 15 to 20 percent of the reduced supply during a severe drought year. The aquifers within the district have limited yield, so it is not practical to greatly increase production of wells within the district.

The BVWD supply system consists of the Wintu Pump Station on the Sacramento River and five wells. Water pumped from the river is treated at the district's treatment plant, which provides in-line filtration. Distribution facilities include a network of transmission and distribution pipelines, three storage tanks, nine booster pump stations, and pressure-reducing facilities. The major distribution piping was installed by Reclamation, but has been extended considerably to serve many subareas. Funding for initial system construction was through an extension of the CVP for the main supply facilities and through a loan from Reclamation for the distribution system. The main supply system is still owned by the U.S. Government, but was constructed solely for use by BVWD. Both domestic and agricultural users are served through

the same distribution system, so all water is treated to meet the higher water quality standards for domestic use. The CVP water that BVWD formerly purchased from Shasta County Water Agency (proposed for assignment to Bella Vista in the contract renewal) is described below under "Shasta County Water Agency."

Centerville Community Services District

The CCSD was originally formed in September 1959 under California Government Code, Division 3, Community Services Districts, Section 61000, et seq. The purpose for creating the district was to (a) supply the inhabitants of the district with water for domestic use, irrigation, sanitation, industrial use, fire protection, and recreation and (b) to provide fire protection services. The service boundary currently encompasses 11,278 acres in the unincorporated area of the Shasta County immediately west of the City of Redding. CCSD provides municipal and industrial water to 1,125 metered connections that serve a population of approximately 2,850 according to the latest census survey. CCSD's water supply comes from surface water from the Whiskeytown Reservoir and is treated at a plant located at the base of Whiskeytown Dam. The treatment plant has an approximate capacity of 30 million gallons per day (mgd). The treated water is transmitted via the 45-inch Muletown Conduit to the headworks of the distribution facility located in the vicinity of Muletown Road and Clear Creek Knolls Road. The district shares the inline treatment facility with the CCCSD.

CCSD has a contract with CCCSD that allocates CCSD a 25 percent share of the capacity. CCSD currently holds two contracts with Reclamation for a total allocation of 3,800 acre-feet per year. The first contract (No. 14-06-200-3367X) is an Assignment Contract which was entered into on April 11, 2001. This contract permanently assigned 2,900 acre-feet per year of CVP water from Shasta County's 5,000-acre-foot per year contract with Reclamation. This contract carries with it those terms and conditions defined in the County's contract (No.14-06-200-3367A), which also includes a Binding Agreement for Early Renewal. The second contract (No. 00-WC-20-1708) is an Exchange Contract and was entered into on August 11, 2000. This contract for 900 acre-feet per year with Reclamation was to provide CCSD with substitute project water for its pre-1914 water rights on Clear Creek. The CCWD does not have access to a ground water supply source (10/03 personal communication).

City of Redding (Sacramento River, Spring Creek, Toyon) (Buckeye Zone)

The City of Redding is the largest city in Shasta County, with a population of approximately 84,600 (2002). Prior to 1941, water service within the City of Redding was provided by non-CVP contracts with Reclamation via the California Water Service Company, whose water rights dated from 1886. The city acquired the local facilities and water rights of the company in 1941 and filed for additional appropriative water rights of 5 cubic feet per second (cfs) in 1944. Subsequent annexations to the city's service area include the Buckeye County Water District, the Cascade Community Services District, and the Enterprise Public Utility District in 1967, 1976, and 1977, respectively. The city provides CVP and non-CVP water service to about 24,709 (09/00 personal communication) service connections. All connections are for municipal and industrial uses with only incidental agricultural uses.

The city currently administers the Buckeye zone under a long-term CVP contract. The Buckeye zone service area includes two City of Redding pressure zones: Buckeye and Summit City. Approximately half of the Buckeye zone is located within the Redding city limits, and the other half is in an unincorporated area of Shasta County. ~~The~~ Approximately one-quarter of the Summit City zone falls ~~entirely~~ within an unincorporated area of Shasta County, and three-quarters fall within the city limits of the City of Shasta Lake. There are 4,179 connections in the Buckeye zone. The Buckeye zone receives water from Whiskeytown Lake via the Spring Creek conduit. During peak demand periods, supplemental water is pumped from the Sacramento River, then treated, and delivered into the Buckeye zone service area ~~at the CVP price~~. The 58 M&I connections in the Summit City zone are supplied exclusively by water diverted from Shasta Lake via the Toyon pipeline. The water is treated by the City of Shasta Lake and delivered to the Summit City zone at the CVP price. There are no known groundwater resources within the Buckeye zone service area.

The city has ~~two~~ one additional water contract~~s~~ with Reclamation~~. One additional contract~~ which is Redding's ~~1996~~ 1966 Settlement Contract with Reclamation, which specifies a "Base Supply" and a "Project Water Supply." The Base Supply was ~~15,385 acre-feet in 1995 and increased by 255 acre-feet per year to~~ a maximum of 17,850 acre-feet per year in 2003. The Project Water Supply was 2,715 acre-feet in 1995 and increased by 45 acre-feet per year to 3,150 acre-feet per year in 2003. The total 1996 entitlement was 18,400 acre-feet per year, and the total 2003 entitlement was 21,000 acre-feet per year. ~~The city's other contract with Reclamation is a CVP long-term water service contract that provides 9,290 acre-feet (according to PEIS data sources).~~

The city's surface-water supply comes from the Sacramento River and Whiskeytown Lake. Sacramento River water is treated at the 24 mgd Foothill Water Treatment Plant, and the Whiskeytown Lake water is treated at the 7 mgd Buckeye Water Treatment Plant.

Redding supplements its surface-water supply with well production capacity from the Redding Groundwater Basin. Currently, 14 wells are operational, providing a total capacity of up to 12 mgd. The well systems are used to supplement the city's surface-water supplies, primarily during peak demand periods. The return flow of groundwater to the river from the City's wastewater treatment facilities contributes to water supplies for downstream users.

City of Shasta Lake

The City of Shasta Lake was incorporated in 1993, and has a population of nearly 10,000 (2003). Prior to incorporation, utility services, including water supply, were provided by the Shasta Dam Area Public Utilities District (PUD). The PUD was formed in 1945 to provide a reliable water supply for an area of 3.5 square miles. Prior to formation of the PUD, water was supplied by a series of wells with low and unreliable yields. Originally, the PUD's service area was a residential area established to house workers constructing Shasta Dam. Reclamation constructed a water transmission pipeline from Shasta Lake to the PUD in 1948 and concurrently the PUD constructed water storage and distribution systems. The Summit City PUD was annexed in 1978.

Today, the City of Shasta Lake provides water service to 3,800 (2003) service connections. Urban and residential land uses predominate.

Water is obtained exclusively from Shasta Lake via a pump station at Shasta Dam, with a maximum diversion of 5.0 mgd. An interim contract with Reclamation (Contract No. 4-7-20-~~w~~W1134-IR~~2~~10) provides an allocation of ~~2,750~~ 4,400 acre-feet per year from this source. Reclaimed water is also available for industrial and landscaping use. Groundwater use is limited because of low aquifer yields.

Clear Creek Community Services District

In 1891, the Happy Valley Irrigation District was formed. The source of water was Rainbow Lake. Through the district, the water users attempted to buy Dry Creek Flume and Tunnel Company's canal system, but negotiations were unsuccessful. In 1902, the Happy Valley Land and Water Company was formed and sold stock to the farmers and non-resident land owners with the understanding that each share of stock carried water for one acre of land, causing the land value to increase dramatically. However, Happy Valley Land and Water Company's revenues were not sufficient to do necessary maintenance, and the Happy Valley Irrigation District was eventually formed (using the same name as the District formed in 1891). The Legislature passed an Act in 1917 validating the organization of the District. This Act assured the stability of Irrigation District Bonds. The Happy Valley Irrigation District eventually went bankrupt, and residents were left only with private wells. CCCSD was formed in 1961. The facilities were designed and constructed by Reclamation, and the District began operating in 1967.

CCCSD presently encompasses about 14,314 acres~~, including several large annexations~~. At the present time, of the 14,314 acres within the district's service area, there are approximately 5,817 acres of irrigated agricultural land, approximately 4,000 acres of rural residences receiving M&I water, and approximately 4,497 acres that are undeveloped.

The district developed the first of three proposed wells and installed 13,800 feet of 18-inch pipeline to connect the groundwater supply to the distribution system. The system and single well went online in October 1992. Well #1 and two proposed wells are intended for use only when surface supplies are inadequate to meet demand or for emergencies.

The majority of the developed agricultural property in the district is ditch- or flood-irrigated. The balance of irrigation is done by overhead and drip systems.

The population served by the CCCSD is scattered throughout a rural environment, and no urban centers exist. The district's population has, in recent years, been increasing at about a 2 to 3 percent annual rate due to its attractive small farm atmosphere where residents can have a few head of cattle on several acres of irrigated pasture.

CCCSD is located approximately ~~10~~ ten air miles southwest of Redding and six air miles west of Anderson in southern Shasta County. The area served by the district is situated on a plateau, which rises from the floor of the Sacramento Valley. The plateau ranges in elevation from 450 to 900 feet and is dissected by deep washes that provide seasonal drainage. The district's service area includes the rural areas known as Olinda and Cloverdale. The overall general area served by the District is commonly referred to as Happy Valley.

The source of the district's water supply is Whiskeytown Lake, a reservoir formed by Clear Creek waters impounded by Whiskeytown Dam. The reservoir covers about 3,250 acres at maximum capacity, providing water storage of about 241,000 acre feet. The reservoir provides the capacity to regulate the flows of the Clear Creek watershed and the imported flows from the Trinity River, which discharge through the Carr Powerhouse into the reservoir. Releases are made from the reservoir to the Sacramento River through the Spring Creek Tunnel and downstream through Clear Creek. Water is diverted to the district through two intakes in the earthen-fill dam structure, one at an elevation of 1,110 feet and the other at an elevation of 965 feet. The ability to select the depth of the diverted water gives the District the capacity to draw less turbid water.

The district is served by an aqueduct that begins at outlets in Whiskeytown Dam and terminates at a 250,000-gallon control tank about eight and one half miles south of the Dam. This aqueduct, commonly called the Muletown Aqueduct (also Muletown Conduit), consists of about 27,500 feet of 45-inch pipe and 17,400 feet of 42-inch pipe buried ~~along a rather tortuous route~~ along Muletown Road, paralleling Clear Creek. The coal tar enamel-lined and coated steel pipe was installed in 1965. The district's water system, designed and constructed by Reclamation, was completed and the District began operation in 1967. The distribution system within the district's boundaries consists of approximately 75 miles of pipe ranging in size from 2 inches to 45 inches. Title to the distribution system was transferred to the District on May 29, 2001.

The district has one storage tank along the conduit with a 1 million gallon capacity. There is also one control tank for pressure regulation at the upper elevation of the district with a 250,000 gallon capacity. The storage tank at the booster station facility, outside district boundaries, is 32,000 gallons.

Shasta Community Services District

SCSD is located west of the City of Redding. SCSD was formed in June 1959 under the Community Services District Laws, Sections 61000 through 61934 of the Governmental Code of the State of California. The district was formed for the primary purpose of supplying water for domestic use and fire protection to the town of Shasta and adjacent developed areas of the district. The district currently serves 630 connections. Virtually all of the active land use is municipal, consisting primarily of ranchettes.

Congress authorized a water system for the area as part of the Trinity River Project. Bonds were issued by SCSD to finance construction of the transmission and distribution systems. These bonds have since been repaid.

CVP long-term service contract water ~~is~~ provide~~d~~s for up to 1,000 acre-feet annually. Water is supplied by gravity from Whiskeytown Lake via a turnout on the Spring Creek Conduit. The Spring Creek Conduit is the only source of supply, and there is only 0.30 million gallons of storage located near the source. Downstream of the turnout, a single transmission main serves as the backbone of the distribution system and most mains are not looped.

SCSD has historically been vulnerable to disruptions in supply from its Reclamation contract. During the 1991 drought, Reclamation reduced SCSD's allotment by ~~75~~ 25 percent to ~~250~~ 750 acre-feet per year. Groundwater wells are not feasible because the district does not overlay an aquifer.

Shasta County Water Agency

The Shasta County Department of Water Resources was created in 1954 to organize Shasta County's efforts in conjunction with the Trinity River Project. This led to the formation of the SCWA in 1957 through the Shasta County Water Agency Act, Legislative Act 7580. The SCWA was created to control and conserve surface water for the beneficial use and protection of life and property of the people of Shasta County. Funding for the SCWA comes from Shasta County property taxes.

The SCWA actively promotes the creation of public water and sewer systems. The agency was instrumental in the creation of BVWD, Centerville Community Services District, CCCSD, and SCSD, as well as six county service areas for water and two for sewer service.

In 1967, the SCWA negotiated a 37-year contract with Reclamation for 5,000 acre-feet of "Project Water" or replacement water. This water was ~~is~~ wholesaled to 14 subcontractors throughout the county, but portions have been or are being assigned to Centerville (2900 acre-feet), Mountain Gate (1,000 acre-feet), and Bella Vista (578.7 acre-feet). The 500 acre-feet the County has under the KCSA contract would be combined with the SCWA contract during a contract renewal for administrative simplicity. "Project Water" may be used for municipal, industrial, and domestic use, and replacement water may be used for agricultural purposes and/or municipal, industrial, and domestic uses.

Other Shasta and Trinity River Divisions CVP Contractors

Three smaller water districts are included in the Shasta and Trinity River Divisions. The three districts constitute about 1 percent of the CVP long-term contract water supply to the divisions.

Keswick County Service Area

The KCSA is located west of the City of Redding. KCSA was preceded by the Keswick Community Services District, which was formed in the early 1960s under the Community Services District Laws, Sections 61000 through 61934 of the Governmental Code of the State of California. The district was formed for the primary purpose of supplying water for domestic use and fire protection to the town of Keswick and adjacent developed areas. Congress authorized a water system for the area as part of the Trinity Project Act (69 Stat. 719) and the facilities were constructed in 1965. A repayment schedule was established whereby the Federal government is reimbursed by KCSA for transmission and distribution system construction costs. However, upon completion of repayment, ownership of all project facilities will still remain with the Federal government. On October 23, 1990, the Keswick Community Services District was dissolved and reorganized as the Keswick County Service Area under Sections 25210.1 through 25250 of the Governmental Code of the State of California. KCSA serves about 195 connections (2000), which are concentrated in the town of Keswick. The district boundaries encompass facilities not served by the district, including Keswick Dam and the Spring Creek Diversion Dam. The land uses served by KCSA are exclusively ranchettes.

Federal CVP water is provided under the terms of a contract with Reclamation. The contract (to be combined with the SCWA contract) provides for deliveries of up to 500 acre-feet annually. Water is supplied by gravity flow from Whiskeytown Lake via a turnout on the Spring Creek Conduit, which feeds the Spring Creek powerhouse. Two storage tanks provide total storage of 0.2 million gallons.

Mountain Gate Community Services District

MGCSD is located north of the City of Shasta Lake. MGCSD was formed pursuant to Government Code, Title 6, Division 3, Sections 61000 through 61800. MGCSD was initially formed in 1956 to provide water service within a ~~2~~two-square-mile area. MGCSD provides water service to 593 connections (2000). In addition, the district provides fire protection services in its service area. The primary land use is ranchettes. Other significant uses are urban and industrial.

MGCSD obtains CVP water from Shasta Lake under the terms of a contract with Reclamation for 350 acre-feet per year. This contract allotment was ~~is~~ supplemented by an additional 1,000 acre-feet via a contract with the SCWA., that was assigned to MGCSD February 22, 2005. The district also operates three wells within a small usable aquifer. These wells supply nearly half of MGCSD's total needs annually. The distribution system consists of 29 miles of pipelines serving 3,750 acres within the MGCSD, in addition to Bridge Bay Resort, which is located on the USFS land adjacent to Shasta Lake. There is no storage within the district.

USFS Centimudi Boat Ramp

The Centimudi boat ramp is part of the original Centimudi Marina Project located east/southeast of Shasta Dam. The Memorandum of Agreement signed November 8, 1967, between the USFS and Reclamation (Contract No. 14-06-200-3464A) stipulated that the USFS could divert up to ~~10~~ ten acre-feet of municipal, industrial, and domestic water from the Toyon Pipeline to supply the Centimudi Marina Project. The Toyon Pipeline, a Reclamation facility, originated from the left abutment of Shasta Dam and diverted water to a point near the Government Camp at Toyon (west of the City of Shasta Lake). The USFS agreed to construct, operate, and maintain the pipelines, pumps, and meters to facilitate the water diversion. Further, the USFS agreed to assume responsibility for controlling and distributing the water. ~~Currently the Marina is serviced by the Shasta Community Services District.~~

4.2.2 ENVIRONMENTAL CONSEQUENCES

The effects of Alternatives 1 and 2 on surface water supplies and operations are compared to conditions under the No Action Alternative.

No Action Alternative

Under the No Action Alternative, it is assumed that historic annual surface water supplies under CVP operations plans would be similar to existing conditions to Contractors in the Shasta and Trinity River Divisions. Under the No Action Alternative, ~~the water supply would be affected by climate conditions. During the driest years,~~ tiered water pricing would become a requirement of each Contractor's long-term contract renewal. Under tiered water pricing ~~under~~ for the No Action Alternative, 80 percent of the Contractor's M&I water supply would be supplied prior to meeting the agricultural water demand. ~~(Also, water conservation planning is a requirement of interim contracts and future long-term contract renewals.)~~

Alternative 1

Under Alternative 1, the water supply available for delivery to the Contractors is assumed to be similar to the No Action Alternative. Alternative 1 assumes that future long-term renewal contracts would be equal

to the ~~base~~ maximum quantity in existing long-term contracts or interim contracts. Therefore, the water supply would be the same as it would be under the No Action Alternative. Consequently, there would be no direct environmental consequences associated with water supply when compared to the No Action Alternative.

Alternative 2

Under Alternative 2, the water supply delivered is assumed to be the same as for the No Action Alternative. Alternative 2 assumes that the sum of Category 1 and 2 water is equal to the maximum quantity provided in the Contractors' existing water service contracts. Future long-term contracts are expected to be renewed for the same quantity of water as under the No Action Alternative. Therefore, there would be no direct adverse environmental consequences associated with water supply compared to the No Action Alternative.

4.2.3 CUMULATIVE EFFECTS

No environmental consequences to water supply are expected under Alternative 1 or 2 when compared to the No Action Alternative. Therefore, no cumulative effects are anticipated when compared to the No Action Alternative.

4.3 SOCIOECONOMICS

4.3.1 AFFECTED ENVIRONMENT

All of the water Contractors and service areas within the Shasta and Trinity River Divisions of the CVP potentially affected by CVP long-term water contract renewals are located in Shasta County. Accordingly, Shasta County was selected as the regional area of influence for the demographic, land use, and economic impact evaluation for Alternatives 1 and 2 and the No Action Alternative. To be consistent with the time frame of the affected environment and environmental consequences components of the CVPIA PEIS, 1994/95 data are included in the affected environment characterization for the evaluation of the CVP contract renewal alternatives under consideration (to the extent such data are available).

Demographics

Table 4.3-1 presents recent population estimates for Shasta County broken down by major ethnic group. The table indicates that the County's estimated population in the year 2000 was 172,000 (California Department of Finance [CDOF], 2003b).

TABLE 4.3-1
SHASTA COUNTY POPULATION

Year	Total	White	Hispanic	Asian and Pacific	Black	American Indian
1995	159,700	141,767	7,592	3,465	1,447	6,773
1998	161,900	141,672	8,468	3,844	1,631	6,285
2000	163,256	141,721	8,975	4,058	1,729	5,429

Sources: State of California, Department of Finance, Race/Ethnic Population Estimates: Components of Change for California Counties, April 1990 to April 2000. Sacramento, California, March 2003; State of California, Department of Finance, E-1 City/County Population Estimates, with Annual Percent Change, January 1, 2002 and 2003. Sacramento, California, May 2003.

In 2003, approximately half of Shasta County's 172,000 residents lived in the County's largest city, Redding. In January 2003, Redding's population was approximately 85,700, 8 percent more than in 1998 (CDOF, 2002). The County's second most populated city, Shasta Lake, had a reported 2003 population of about 9,725 people. Approximately 40 percent, or 67,100, of Shasta County's residents live in the County's unincorporated areas (CDOF, 2003b).

Table 4.3-2 characterizes the overall housing situation within Shasta County. The table indicates that the County's housing vacancy rate was approximately 7.8 percent of existing housing units in 2003 (CDOF, 2003c).

TABLE 4.3-2
SHASTA COUNTY HOUSING (2003)

Housing Stock	71,683
Single Units	50,064
Multiple Units	10,806
Mobile Homes, Trailers, etc.	10,813
Vacancy Rate	7.8%
Occupants per household	~2.5

Source: State of California, Department of Finance, E-5 City/County Population and Housing Estimates, 2003, Revised 2002 and Revised 2001, with 2000 DRU Benchmark. Sacramento, California, May 2003.

There are a total of ~~10~~ ten separate water districts/agencies (districts) within the Shasta and Trinity River Divisions of the CVP that currently receive CVP water designated for M&I uses through contracts undergoing the contract renewal process (referred to as contract water).

Table 4.3-3 presents 1994 estimates of the population served by the four largest of these districts, BVWD, CCCSD, City of Shasta Lake, and City of Redding (California Department of Water Resources 1994). In 1994, these districts together received almost 85 percent of the total CVP M&I contract water that was delivered to the Shasta and Trinity River Divisions.

TABLE 4.3-3
POPULATION SERVED WITHIN SELECTED WATER DISTRICTS (1994)

	BVWD	CCCSD	City of Shasta Lake	City of Redding
Population Served	15,700	8,000	9,820	78,266

Source: California Department of Water Resources 1994

Municipal and Industrial Water Costs, Land Use, and Economics

The water Contractors, identified in Table 4.3-3, treat and deliver CVP and other water to residential, commercial, and industrial customers within their service areas. Table 4.3-4 itemizes the number of M&I service connections reported by each district in 1994, by service connection category.

TABLE 4.3-4
M&I SERVICE CONNECTIONS WITHIN LARGEST WATER DISTRICTS* BY M&I CATEGORY (1994)

Service Connection Category	BVWD	CCCSD	City of Shasta Lake	City of Redding	Total Connections *
Single-Family Residential	233	1,441	2,997	18,643	23,314
Multi-family Residential			289	456	745
Commercial/Institutional	158		189	3,837	4,026
Industrial		1	5	464	470
Other (government)				195	195
Landscape Irrigation				3	3
Other (rural)	864				864
Total Connections *	**3,855**	**1,442**	**3,480**	**23,598 ****	32,375 **

Source: California Department of Water Resources 1994
*Some of the districts do not report separately for single- and multi-family residential connections. These connections represent approximately 85% of the Shasta and Trinity River Divisions.
**Includes ~4,179 connections for CVP water under Buckeye Contract.

Table 4.3-5 presents estimated water deliveries by service connection category for each of the water districts presented in Table 4.3-4. All of these water deliveries were metered, except the City of Redding's deliveries to its landscape irrigation users. The table indicates that about half of the City of Redding's 1994 M&I water deliveries were for landscape irrigation purposes. (A review of reported customer water deliveries in 1999 indicates that deliveries categorized under landscape irrigation were greatly reduced in that year from the 1994 levels. At the same time, the City's reported single-family residential deliveries increased substantially, despite little change in the Redding service area population.)

TABLE 4.3-5
1994 DELIVERIES OF TREATED WATER TO M&I CUSTOMERS BY M&I CATEGORY
(ACRE-FEET PER YEAR)

Service Connection Category	BVWD	CCCSD	City of Shasta Lake	City of Redding
Single-Family Residential	2,030	471	1,573	12,520
Multi-family Residential			110	258
Commercial/Institutional	1,401	2	333	7,524
Industrial			74	476
Other (government)				566
Landscape Irrigation				21,354
Other (rural)	1,891			
Total Per District in Acre-Feet Per Year	**5,321**	**474**	**2,090**	**42,699 ***
1994 Average (acre-feet per year per connection) (Connection data from Table 4.3-4)	**1.38**	**0.33**	**0.6**	**1.81**

Source: California Department of Water Resources, 1994
Includes the Buckeye Contract for CVP water as well as other agreements and contracts.

Table 4.3-6 presents the estimated M&I deliveries of CVP water in 1994 to each of the CVP Shasta and Trinity River Contractors that receive CVP water designated for M&I uses (Reclamation 2000). (In 2001, 2,900 acre-feet of water previously ~~assigned to~~ under contract with the Shasta County Water Agency was reassigned to Centerville Community Services District. The tables in this section currently include the CCSD assignment from the Shasta County Water Agency. See footnote in tables.)

TABLE 4.3-6
CVP CONTRACT MAXIMUM, M&I DELIVERIES AND ESTIMATED COST (1994)

Factor	MGCSD	City of Shasta Lake	USFS	KCSA	SCSD	SCWA (Including CCSD)*	BVWD	CCCSD	City of Redding (1)
CVP Contract Maximum (acre-feet)	350	2,750	10	500	1,000	5,000*	~~22,000~~ 24,000	15,300	~~9,250(1)~~ **6,140(1)**
Estimated M&I Deliveries (acre-feet)	350	2,410	10	158	593	1,267*	5,567	1,928	2,822
1994 Cost-of-Service Rate (per acre-foot)	$9.00	$13.82	$20.00	$13.17	$10.77	$19.44*	$39.00	$26.09	$11.40
Total Estimated Cost	**$3,150**	**$33,306**	**$200**	**$2,081**	**$6,387**	**$24,630***	**$217,113**	**$50,302**	**$32,171**

Source: Bureau of Reclamation 2000a, Bureau of Reclamation 1994a, Dornbusch & Company
(1) **Also receives** ~~Includes~~ 3,150 acre-feet of settlement water, ~~and 6,100~~ 6,140 ~~acre-feet of CVP under Buckeye Contract water~~
* Includes 2,900 acre-feet per year which was assigned by contract to CCSD by Reclamation in April 2001

A comparison of Tables 4.3-5 and 4.3-6 indicates that BVWD, CCCSD, and the City of Shasta Lake receive the majority of their M&I water through CVP long-term renewal contracts. The disparity between CCCSD's 1994 CVP deliveries (1,928 acre-feet) and the district's treated deliveries to its M&I customers (474 acre-feet) may be explained by the fact that CCCSD sells some of its M&I water to other districts, including BVWD. A comparison of the two tables also reveals that only a relatively small portion of the

City of Redding's M&I water comes from its contract water. However, the entire Buckeye contract (City of Redding) receives 100% of its M&I water from the CVP.

Table 4.3-6 also presents the 1994 M&I contract cost-of-service rates published by Reclamation applicable to each district's contract water. The table shows the estimated total cost-of-service incurred by each district in that year based on their recorded CVP M&I contract water deliveries. In 1999, the City of Shasta Lake's average household water bill per 1,000 cubic feet of water was approximately $15.40 per month (City of Shasta Lake 2000). This translates to about $670 per acre-foot. (One acre-foot of water equals 43,560 cubic feet of water or the amount of water a family of five uses a year.) In 1999, the City of Shasta Lake paid a cost-of-service rate for untreated CVP water of $15 per acre-foot (compared to $13.82 in 1994, as shown in Table 4.3-6). Accordingly, the actual average cost of CVP water treated and delivered to residential customers within the City of Shasta Lake in 1999 was almost 45 times the cost-of-service rate that they paid for that water. This is to be expected since an M&I district's cost of untreated water is usually a relatively small component of its cost to treat, store, and deliver water to its customers (and thus the rates charged to its customers). Similar findings would be expected for the other Shasta and Trinity River Divisions ~~water districts~~ contractors.

Agriculture Water Costs, Land Use, and Economics

Both BVWD and CCCSD supply treated contract water designated for agricultural purposes to irrigators within their service areas. In 1996, a total of 7,319 acres of land within the two districts that were designated for CVP agricultural water use were irrigated with CVP water: 3,388 acres in BVWD and 3,931 acres in CCCSD (Reclamation 1996). The districts together received approximately 10,000 acre-feet of CVP agricultural contract water in 1994 (purchases from other CVP Contractors aside).

While field, vegetable, and fruit crops are grown in the County and the districts, pasture is by far the predominant crop, representing about 50 percent of irrigated agriculture in the county. Table 4.3-7 summarizes the cropping pattern for each district, as reported to Reclamation for 1996. The table indicates that like Shasta County as a whole, a large portion of the both districts' irrigated lands is in pasture, particularly BVWD.

TABLE 4.3-7
CROPPING PATTERNS (1996)

Crop / Crop Group	BVWD (acres)	Percentage of BVWD Total	CCCSD (acres)	Percentage of CCCSD Total
Pasture	2,813	84.7%	1,785	48.5%
Alfalfa	217	6.5%	25	0.7%
Sugar Beets		0.0%		0.0%
Other Field Crops	176	5.3%	738	20.0%
Rice		0.0%		0.0%
Truck Crops	1	0.0%	86	2.3%
Tomatoes	1	0.0%	30	0.8%
Deciduous Orchards	52	1.6%	993	27.0%
Small Grain	63	1.9%		0.0%
Subtropical Orchard		0.0%	24	0.7%
Total	**3,323**		**3,681**	

Source: Bureau of Reclamation 1996 and Dornbusch & Company 2000

The Census of Agriculture reports that in 1997, there were 850 farms in Shasta County, of which 605 had some or all of their land under irrigation. Total irrigated acreage within the County reported in 1997 was approximately 38,863 acres (NASS 1999). Accordingly, lands receiving CVP water designated for irrigation with CVP agricultural water within the BVWD and CCCSD represent about 20 percent of the county's total irrigated land base.

Much of the irrigated lands in Shasta County and, in particular, in the BVWD and CCCSD, consists of relatively small parcels. The 1997 Census of Agricultural indicates that over half of the irrigated farms within Shasta County are less than ~~9~~ nine acres in size. Table 4.3-8 shows the agricultural service connections and customer water deliveries reported by BVWD and CCCSD in 1994. The table also shows the estimated average amount of land per agricultural service connection in each district, 6.5 acres in BVWD and 5.5 acres in CCCSD. (These amounts are calculated by dividing the estimated amount of irrigated acres in each district in 1996 by the number of agricultural connections in 1994. Acreage in 1996 was used because Reclamation was unable to provide accurate irrigated acreage information from 1994. Discussions with local extension agents and others familiar with irrigated farming in Shasta County suggested that the irrigated land base in the BVWD and CCCSD service areas changed little between 1994 and 1996. Therefore, the calculation of irrigated land per connection is deemed reasonable.)

CCCSD reports that in 1999, there were 350 and 338 parcels between 2 and 5 acres in size within the CCCSD and BVWD service areas, respectively, receiving CVP agricultural water (McNeill 2000). Based on the values presented in Table 4.3-8, 2- to 5-acre parcels account for about 50 percent of the CCCSD and 65 percent of the BVWD agricultural service connections.

TABLE 4.3-8
AGRICULTURAL CONNECTIONS AND WATER DELIVERIES (1994)

Factor	BVWD	CCCSD
Irrigated Land (acres) – 1996	3,388	3,931
Agricultural Connections – 1994	524	715
Irrigated Land/Connection (acres)	6.5	5.5
Agricultural Deliveries (acre-feet)	7,247	1,129

Source: California Department of Water Resources 1994, Dornbusch & Company 2000

Table 4.3-9 presents the 1994 cost-of-service rates published by Reclamation for Shasta and Trinity River Divisions agricultural contract water. Cost-of-service (COS) is a term used by Reclamation that refers to the annual rate to be paid by water Contractors to recover federal costs for agricultural and M&I water supply functions for an established repayment period, ~~and according to specific provisions in their respective contracts~~. This rate includes the recovery cost from each Contractor for capital (construction) investment of CVP; accumulated annual O&M, O&M deficit, and interest (M&I only). The table also shows the total cost-of-service incurred by each district in that year based on their recorded CVP agricultural contract water deliveries. Both BVWD and CCCSD receive ability-to-pay relief on their CVP agricultural water. However, no downward adjustment was made to reflect the associated cost savings because no actual records of either district's payments to Reclamation were available.

TABLE 4.3-9
CONTRACT MAXIMUM, AGRICULTURAL DELIVERIES AND ESTIMATED COST BASED ON COST-OF-SERVICE RATES (1994)

Factor	BVWD	CCCSD
CVP Contract Maximum (acre-feet)	24,000	15,300
1994 CVP Agricultural Deliveries (acre-feet)	6,826	3,289
1994 Cost-of-Service Rate ($ per acre-feet))	$11.78	$15,79
Total Estimated Cost ($)	$80,410	$51,933

Source: Bureau of Reclamation 2000a, Bureau of Reclamation 1994b, Dornbusch & Company 2000

Regional Economy

Shasta County's largest industrial sector is services. In 1991, the services sector accounted for about 25 percent of the county's employment base, climbing to almost 32 percent by 1995. Services continue to represent the fastest growing segment of the economy, followed by trade. Agriculture accounts for less than ~~2~~ two percent of the county's employment (EDD 2001).

The estimated average annual unemployment rate for Shasta County in 2002 was 7.4 percent (EDD 2002). The unemployment rate has declined from double-digit levels in the early part of the 1990s, and it exceeds the California state-wide average by less than 1 percentage point (the average annual unemployment rate for California in 2002 was 6.7 percent, [EDD 2002]). However, Shasta County ranked 32nd out of California's 58 counties with respect to per-capita income in 2001 (BEA 2003).

Table 4.3-10 summarizes 1991 industrial output, employment, and income by place-of-work for the county. Data from 1991 were used rather than more current information to be consistent with the temporal setting of the regional economic analysis presented in the PEIS for the CVPIA. California's

Employment Development Department (EDD) reported that the county's unemployment rate in 1991 was almost 11 percent (EDD 1999).

TABLE 4.3-10
ESTIMATED OUTPUT, EMPLOYMENT, AND INCOME BY PLACE-OF-WORK SHASTA COUNTY (1991)

Industrial Sector	Industrial Output *(Million$)*	Employment *(Full-Time Jobs)*	Income POW *(Million$)*
Agriculture	$130.53	2,332	$60.98
Mining	$497.41	272	$419.96
Construction	$604.27	6,746	$200.61
Manufacturing	$684.34	5,270	$258.52
Transportation	$478.03	4,115	$246.68
Trade	$583.20	16,581	$334.48
Fire	$594.88	6,100	$373.84
Services	$808.69	18,751	$469.00
Government	$360.44	11,404	$331.23
	$4,741.79	71,571	$2,695.30

Source: Minnesota Implan Group 1994, Dornbusch & Company 2000

4.3.2 METHODOLOGY OF SOCIOECONOMIC AND LAND USE IMPACT ANALYSIS

The estimated socioeconomic and land use impacts of the contract renewal alternatives are presented in ranges. These ranges extend from the baseline socioeconomic and land use conditions under the No Action Alternative to the potential maximum socioeconomic and land use impacts anticipated under Alternative 2 when compared to the No Action Alternative. In this manner, the evaluation provides "bookends" with which to consider the potential implications of alternative contract renewal options. Alternative 1 is ostensibly identical to the No Action Alternative framework with respect to those elements, particularly water rate setting, that may affect socioeconomics and land use within Shasta County. All of the impacts of Alternative 2 are presented in terms of the incremental change relative to projected No Action conditions. The analysis is conducted for the 25 year contract ~~year 25~~ (2029); however, dollars are reported in 1999, 1994, and 1991 terms, depending on the availability of information and the time frame of the analysis, as well as to maintain consistency with the CVPIA PEIS. It also should be noted that to maintain consistency with the CVPIA PEIS, BVWD and CCCSD projected future CVP M&I and agricultural water use is based on agricultural and M&I land use and development projections reported in the Shasta County General Plan. As such, the M&I and agricultural water and land use projections presented in this EA may differ from projections indicated by other planning documents, including the future water needs assessments submitted to Reclamation by the districts as part of the contract renewal process. However, the projections all call for full use of the contract amounts by ~~contract year 25 (~~2029~~)~~.

Methodology

The analysis of potential impacts on M&I and agricultural land use, M&I and agricultural water cost, and agricultural economics of Shasta and Trinity River Divisions long-term contract renewals is conducted at the level of the specific CVP Contractors that would be affected. However, the analysis of potential regional economic and demographic impacts of contract renewal is conducted at a broader regional level. For the analysis, the affected region is defined as Shasta County. While the secondary economic and demographic effects of the alternatives may extend outside of Shasta County, it is reasonable to anticipate that the majority of those impacts will occur within the county. Ultimately, it is the localized effects of contract renewal that are most relevant to the evaluation of the effects of the alternatives on local communities.

Demographic Impacts

The evaluation of the potential demographic impacts of long-term CVP contract renewal for CVP Contractors in the Shasta and Trinity River Divisions focuses on population. The analysis starts with an assessment of contract renewal-associated regional effects on employment (discussed below), since employment is a primary determinant of population dynamics. However, anticipated regional change in job availability is not the only factor that must be examined in assessing population effects of an action such as CVP contract renewal. The projected population impact of employment changes must be evaluated in the context of general labor market conditions and family size within the relevant area of study. Accordingly, both of these variables are considered in the evaluation of the potential population impacts of contract renewal. California Department of Finance population projections for Shasta County were used as the basis for estimating population conditions under the No Action Alternative.

Municipal and Industrial Water

The assessment of the potential incremental impacts on the cost of M&I water under Alternatives 1 and 2 relative to the No Action Alternative is based on M&I water demand models developed for the CVPIA PEIS. A detailed description of those models is presented in the Municipal Water Costs Technical Appendix for the PEIS (PEIS 1997). In summary, the PEIS M&I models are designed to estimate the potential impact on the cost of CVP M&I water due to anticipated CVPIA-associated changes in CVP water rates and water deliveries. Thus, the M&I water cost impacts presented in the PEIS derive from the proposed introduction of 80-10-10 tiered pricing, a flat restoration charge applied to each acre-foot of delivered water, and the anticipated cost incurred by individual CVP Contractors to acquire alternative water supplies and implement conservation measures to mitigate water delivery reductions due to CVPIA-mandated in-stream and refuge flow set-asides.

The primary source of data used to model water demands, local supplies, and costs in evaluating contract renewal socioeconomic and land use impacts was the California Department of Water Resources Bulletin 160-93. While the information in Bulletin 160-93 was updated in Bulletin 160-98, Bulletin 160-93 was used to be consistent with the CVPIA PEIS analysis assumptions (CDWR 1993). Estimates of future CVP deliveries with and without CVPIA were derived using the PROSIM and SANJASM models (see PEIS, technical appendices for a description of these hydrologic modeling tools).

The results of the analysis of impacts on water cost in the CVPIA PEIS were aggregated into four regions. The Shasta and Trinity River Divisions were included in the Sacramento Valley region.

An implicit assumption of the PEIS M&I cost impact analysis was that both residential and commercial/industrial water users are extremely *price inelastic* within a fairly large range of prices for water (i.e., they will effectively not change their use of water in response to even fairly substantial changes in the price of water). Certainly, price does influence the choice of water supply. However, in the case of Shasta and Trinity River Divisions long-term contract renewals, the PEIS analysis concluded that reliable non-CVP water supplies would cost well in excess of the effective CVP M&I water rates for any of the contract renewal proposals under consideration. Accordingly, no incremental change in future M&I demand for CVP water is anticipated under either Alternatives 1 or 2 when compared to the No Action Alternative.

Consistent with the CVPIA PEIS, the analysis of the socioeconomic impacts of contract renewals focuses on both the long-run average and short-run dry hydrologic conditions, and associated CVP deliveries. Projected post-CVPIA CVP M&I deliveries were obtained from the PEIS M&I models prepared by Reclamation.

The M&I cost analysis of the Preferred Alternative in the CVPIA PEIS (No Action Alternative in this EA) was conducted assuming 80-10-10 tiered pricing and 1994 CVP M&I rates. Alternative 1 does not alter the rate-setting scheme stipulated in the No Action Alternative and, therefore, would not have an incremental impact on Shasta and Trinity River Divisions CVP M&I water costs relative to the No Action Alternative. Alternative 2, however, would have an impact on Shasta and-Trinity River Division Contractors' costs for CVP M&I water.

The M&I cost impact analysis for Alternative 2 assumed the adoption of 80-10-10 tiered pricing, Category 1/ Category 2 water designation, and the 1999 Shasta and Trinity Contractors' CVP M&I rates adjusted to reflect the Alternative 2 proposed revision to the CVP rate-setting methodology. More current estimates of CVP M&I rates consistent with the revision methodology (PEIS 1997) are not available because the methodology has since been dropped from consideration.

The projected impacts of Alternative 2 in contract year 25 (2029) M&I water costs are presented in 1999 dollar terms as the increment above each potentially affected long-term renewal Contractor's estimated cost of CVP M&I water under the No Action Alternative for both the long-run average and short-run dry hydrologic condition.

CVP M&I water rates under Alternatives 1 and 2 are not expected to have any impact on Shasta and Trinity River Divisions' CVP M&I water demand. In addition, the two alternatives do not differ from the No Action Alternative with respect to projected CVP water supply/reliability. Therefore, it is not anticipated there will be any M&I water-related demographic or land use impacts of the contract renewal alternatives. Accordingly, demographic and land use impacts are not addressed in the contract renewal M&I impact analysis. The analysis examines only Shasta and Trinity River Divisions' water-cost-related impacts. As in the CVPIA PEIS, it is assumed that any projected change in the cost of CVP water would be passed directly on to each district's customers, dollar for dollar.

Agricultural Water Cost, Land Use, and Economic Impacts

The assessment of the demographic and agricultural water cost, land use, and economic impacts under Alternatives 1 and 2 were based on the agricultural economic impact assessment models developed for the CVPIA PEIS (PEIS 1997). A detailed description of those models is presented in the Agricultural Economics and Land Use Technical Appendix to the PEIS. In summary, the PEIS agricultural economic and land use models were designed to estimate the potential direct impact of CVPIA-associated changes on agricultural water rates and supply/reliability on agricultural users, including land use, water use, gross value of crop production, and farmer net revenue from irrigation.

Agricultural economic and land use impacts identified in the PEIS resulted from the introduction of 80-10-10 tiered pricing, the addition of a restoration charge on each acre-foot of delivered water, and the projected cost to individual CVP Contractors of acquiring alternative water supplies to mitigate water delivery reductions due to CVPIA-mandated in-stream and refuge flows not offset through conservation. The PEIS agricultural economic impacts were derived by applying the Central Valley Production Model (CVPM). The CVPM is a highly sophisticated tool that predicts farmer response to changes in the price and availability of resource inputs, particularly water. The types of response mechanisms built into the model include land fallowing, crop switching, changes in ground water pumping, etc. These responses ultimately have implications for the total value of crop production, land and water use, and the net revenues to farmers subsequent to an event such as CVPIA implementation or contract renewal.

The CVPM ~~model,~~ as formatted for the PEIS, produces output for each of 22 separate sub regions within California's Central Valley (for reporting purposes in the PEIS, these sub regions were aggregated into four larger regions). The two CVP water Contractors in the Shasta and Trinity River Divisions that

receive CVP agricultural water and would potentially be affected by long-term contract renewals, BVWD and CCCSD, are located in CVPM Region 1. Accordingly, the output of the CVPM ~~model~~ runs for Region 1 were used to estimate the implications of the No Action Alternative and Alternatives 1 and 2 for the agricultural lands and economy within BVWD and CCCSD. Estimates of gross value of farm production derived from CVPM were combined with recent cropping-pattern information for BVWD and CCCSD to calculate district-specific estimates of the gross value of production and farmer net revenue under the contract renewal alternatives.

The No Action Alternative and Alternative 2 would increase the CVP agricultural acreage limitation from 2 to 5 acres. If implemented, this contract stipulation would not necessarily affect the delivery and cost of CVP water for agricultural irrigators on parcels smaller than 5 acres. According to Reclamation, it would simply place a greater burden of proof on those irrigators and their districts to demonstrate that the agricultural water they are receiving (at agricultural water rates) is being put to legitimate agricultural uses. Reclamation representatives believe that the change in acreage limitation would ultimately have little or no effect on the cost of water for farmers with parcels between 2 and 5 acres within the Shasta and Trinity River Divisions. It could, however, place an additional administrative burden on farmers and their districts in managing CVP deliveries (Holt 2000), although the burden would not be great since the applicable guidelines for determining agricultural use will remain unchanged.

4.3.3 Environmental Consequences

Demographics

No Action Alternative

Table 4.3-11 presents the projected year 2030 population for Shasta County. Under the No Action Alternative, population is forecast to increase by more than 50 percent from estimated levels in 2000.

TABLE 4.3-11
YEAR 2030 PROJECTED SHASTA COUNTY POPULATION

Year	Total	White	Hispanic	Asian and Pacific	Black	American Indian
2030	267,749	225,353	20,500	12,111	2,457	7,330

Source: CDOF 1998, Dornbusch & Company 2003

Alternative 1

The effects of Alternative 1 on demographics within the affected region are assumed to be similar to those of the No Action Alternative. Therefore, Alternative 1 would have no impact on demographics.

Alternative 2

Implementation of Alternative 2 could result in a loss of, or failure to create, as many as 46 jobs within Shasta County in contract year 25 (2029). Given historically high unemployment within the County and adjacent region, it is not anticipated that the workers who would be displaced could readily find alternative employment. Accordingly, the loss of employment under Alternative 2 could result in a long-run decrease in the Shasta County population of at most about 100 people, or approximately 0.04 percent, when compared to projected population levels under the No Action Alternative. Alternative 2 would therefore have a minor effect on demographics in Shasta County.

Municipal and Industrial Water Costs, Land Use, and Economics

No Action Alternative

Table 4.3-12 presents the 1994 actual cost of service and estimated mid-tier and full-cost CVP M&I water rates for the Shasta and Trinity CVP Contractors that would be affected by contract renewal. The 1994 rates are presented because these are the rates applied in the most current evaluation of M&I water cost impacts available.

ESTIMATED 1994 M&I WATER RATES UNDER 80-10-10 TIERED PRICING, SHASTA AND TRINITY RIVER CONTRACTORS

CVP Contractor	Cost-of-Service Rate [1] 1st Tier (80%)	Midpoint[1,2] 2nd Tier (10%)	Full-Cost Rate[1] 3rd Tier (10%)
BVWD	$39.00	$44.99	$50.00
CCCSD	$26.09	$32.81	$39.53
City of Redding[3]	$9.00-$11.40	$9.00-$13.24	$9.00-$15.08
SCWA[4]	$19.44	$23.02	$26.60
MGCSD	$9.00	$9.45	$9.90
KCSA	$13.17	$15.73	$18.28
SCSD	$10.77	$12.62	$14.47
City of Shasta Lake	$13.82	$13.82	$13.82
USFS	$20.00	$20.00	$20.00

Source: Bureau of Reclamation 1994a, Dornbusch & Company 2000
1 In 1994 the Bureau did not publish the full-cost rate for M&I water. Accordingly, these rates were estimated based on the ratio of the cost-of-service and full-cost rates for each CVP long-term renewal Contractor in 1997, the first year full-cost M&I rates were published.
2 Midpoint estimated as the simple average of the cost-of-service and full-cost rates.
3 City of Redding pays a range of prices for its CVP M&I water, since the water is delivered through different facilities.
4 Includes Centerville Community Services District.

Table 4.3-13 presents the projected contract year 25 (2029) No Action Alternative deliveries and cost of ~~Division~~ CVP M&I water under both average and dry hydrologic conditions for each Shasta and Trinity CVP Contractor that would be affected by contract renewal. The table indicates that the Contractors would pay a total of approximately $1.1 million in contract year 25 (2029) for the untreated CVP M&I water they are projected to take delivery of in a year of average hydrologic conditions ~~per~~ under the CVP contracts ~~undergoing~~ in the renewal process (1999 dollar terms).

Alternative 1

Alternative 1 is assumed to have effects on M&I water costs for the affected water districts similar to the No Action Alternative. Therefore, there would be no environmental effects as a result of implementing this alternative.

TABLE 4.3-13
YEAR 2029 PROJECTED CVP M&I DELIVERIES AND WATER COST, NO ACTION ALTERNATIVE
(1994 DOLLAR TERMS)

CVP Contractor	CVP Contract Maximum (acre-feet)	Projected CVP M&I Deliveries, Average Condition (acre-feet)	Projected Cost of CVP M&I Water, Average Condition ($000s)[1]	Projected CVP M&I Deliveries, Dry Condition (acre-feet)	Projected Cost of CVP M&I Water, Dry Condition ($000s)[1]
BVWD	24,000	6,400	$337.94	4,450	$234.82
CCCSD	15,300	9,420	$377.72	6,540	$262.46
City of Redding	6,140	5,610	$130.84	3,900	$90.91
SCWA[2]	5,000	4,570	$148.65	3,180	$103.29
MGCSD	350	320	$6.76	220	$4.70
KCSA	500	460	$11.86	320	$8.24
SCSD	1,000	910	$21.33	640	$14.82
City of Shasta Lake	~~2,750~~ 4,400	2,510	$64.92	1,750	$45.11
USFS	10	10	$0.29	10	$0.20
Total	**~~55,050~~56,700**	**30,210**	**$1,100.30**	**21,000**	**$764.56**

Source: CH2M Hill 1999, Dornbusch & Company 2000
1 Consistent with CVPIA PEIS analysis, figures are based on 1994 M&I rates and include restoration charge of $12.00 per acre-foot.
2 Includes CCSD.

Alternative 2

Table 4.3-14 presents the 1999 "theoretical" tiered rates for CVP M&I water that Shasta and Trinity River Division Contractors would have paid had the 1999 published rates been revised based on the rate-setting methodology proposed under Alternative 2. For comparison, the table also shows the actual published 1999 M&I cost-of-service rate for each district. The table reveals a potentially large escalation of CVP M&I rates under Alternative 2. For example, the table shows that CCCSD cost-of-service rate in 1999 would have been over three times higher than under the No Action Alternative ($137.59 per acre-foot compared to $42.01 per acre foot). The differences are not as large for the other districts, ranging from no difference in the case of some of the City of Redding's CVP supply to almost 50 percent for KCSA. It should be noted that these rate comparisons account for the potential additional impacts on rates of the Category 1/Category 2 rate-setting measure also stipulated under Alternative 2, which would not be implemented under the No Action Alternative.

Table 4.3-15 presents the maximum incremental impact of Alternative 2 (at contract year 25) on the cost of M&I contract water for each of the potentially affected M&I Contractors under average and dry hydrologic conditions. The table indicates that the total annual cost of untreated CVP M&I water for the Shasta and-Trinity River Divisions under average hydrologic conditions could increase by as much as $1.8 million dollars over the baseline cost of that water under the No Action Alternative (in 1999 dollars). The table also reveals that CCCSD would experience the greatest M&I water cost impact, a three-fold increase in its cost of CVP M&I contract water under average conditions when compared to the No Action Alternative.

TABLE 4.3-14
1999 PUBLISHED AND "THEORETICAL" COST-OF-SERVICE M&I RATES
ASSUMING 80-10-10 TIERED PRICING

	No Action Alterative 1999 CVP M&I Rates	Alternative 2 "Theoretical" 1999 CVP M&I Rates		
	Cost-of-Service Rate ($/acre-foot)	Cost-of-Service Rate ($/acre-foot)	Midpoint[1] ($/acre-foot)	Full-Cost Rate ($/acre-foot)
CVP Contractor	**1st Tier (80%)**	**1st Tier (80%)**	**2nd Tier (10%)**	**3rd Tier (10%)**
BVWD	$57.62	$74.37	$85.13	$95.89
CCCSD	$42.01	$137.59	$165.41	$193.22
City of Redding[2]	$15.00-$21.77	$15.00-$23.41	$15.00-$27.25	$15.00-$31.08
SCWA[3]	$29.77	$37.78	$43.22	$48.66
MGCSD	$17.38	$17.72	$19.88	$22.03
KCSA	$23.60	$35.09	$41.90	$48.71
SCSD	$20.37	$24.57	$28.90	$33.23
City of Shasta Lake	$15.00	$15.00	$15.00	$15.00
USFS	$15.00	$16.30	$17.84	$19.37

Source: Bureau of Reclamation 1999a, Dornbusch & Company 2000
1 Midpoint estimated as the simple average of the cost-of-service and full-cost rates.
2 City of Redding pays a range of prices on its CVP M&I water since the water is delivered through different facilities.
3 Includes CCSD

TABLE 4.3-15
YEAR 2029 IMPACTS ON CVP UNTREATED M&I WATER COST UNDER
AVERAGE AND DRY HYDROLOGIC CONDITIONS

	No Action Alternative	Alternative 2 Incremental Change from No Action Alternative	No Action Alternative	Alternative 2 Incremental Change from No Action Alternative
Contractor	Average Condition ($000s)[1]	**Maximum Impact** - Average Condition ($000s)[2]	Dry Condition ($000s)[1]	**Maximum Impact** - Dry Condition ($000s)[2]
BVWD	$337.94	$280.87	$234.82	$170.34
CCCSD	$377.72	$1,259.72	$262.46	$780.91
City of Redding	$130.84	$88.14	$90.91	$53.85
SCWA[3]	$148.65	$106.16	$103.29	$64.80
MGCSD	$6.76	$3.79	$4.70	$2.39
KCSA	$11.86	$12.91	$8.24	$7.85
SCSD	$21.33	$16.72	$14.82	$10.19
City of Shasta Lake	$64.92	$6.74	$45.11	$4.68
USFS	$0.29	$(0.01)	$0.20	$(0.01)
Total	**$1,100.30**	**$1,769.17**	**$764.56**	**$1,095.00**

Source: CH2M Hill 1999, Bureau of Reclamation 1999a, and Dornbusch & Company 2000
1 Based on 1994 published rates and $12 dollar restoration charge, since the most currently available analysis of M&I water cost impacts is based on 1994 rates.
2 Based on 1999 revised rates and a $13.50 dollar restoration charge.
3 Includes CCSD.

The anticipated water cost increases presented in the table would be passed directly onto individual customers of the affected districts. However, the percentage increases in residential water bills would be much smaller than the percentage increase in the Contractors' cost of untreated CVP water, since the cost of the untreated water is only a small part of an individual's total residential M&I water bill. Nonetheless, any increase in residential water rates could have a noticeable impact on individuals and families with limited income and ability to pay more for their water, given the small changes over the preceding 40 years.

Agricultural Water Costs, Land Use, and Economics

No Action Alternative

Table 4.3-16 presents the 1999 published cost of service and full-cost agricultural water rates for BVWD and CCCSD. The table reveals a greater disparity in the BVWD cost-of-service rate and full-cost rate than for CCCSD. Unlike the assessment of the impacts of contract renewal on CVP M&I water cost, the assessment of the impacts on the cost of CVP agricultural water under the No Action Alternative is based on 1999 rates because the PEIS agricultural economic analysis was updated to 1999.

TABLE 4.3-16
ESTIMATED 1999 AGRICULTURAL WATER RATES UNDER 80-10-10 TIERED PRICING, TWO SHASTA AND TRINITY TRIVER CONTRACTORS

	Cost-of-Service Rate	Midpoint	Full-Cost Rate
CVP Contractor	1st Tier (80%)	2nd Tier (10%)	3rd Tier (10%)
BVWD	$22.89	$38.105	$53.32
CCCSD	$18.21	$25.21	$32.20

Source: Bureau of Reclamation 1999b, Dornbusch & Company 2000

Table 4.3-17 presents the anticipated contract year 25 (2029) Gross Value of Production, CVP agricultural water use, and amount of irrigated land in the BVWD and CCCSD service areas under the No Action Alternative. The table reveals that BVWD irrigators are projected to use two times more CVP water than CCCSD irrigators on only about 25 percent more land. This disparity in water use can be explained by the fact that a greater proportion of the BVWD cropping pattern is projected to be pasture, a water intensive crop.

TABLE 4.3-17
YEAR 2029-GROSS VALUE OF PRODUCTION-CVP AGRICULTURAL WATER USE AND IRRIGATED LANDS NO ACTION ALTERNATIVE-BVWD AND CCCSD

	BVWD		CCCSD	
Factor (Based on 1999 Dollars)	No Action Alternative (Average Condition)	No Action Alternative (Dry Condition)	No Action Alternative (Average Condition)	No Action Alternative (Dry Condition)
Gross Value of Production (Million$)	$1.95	$1.95	$4.58	$4.58
CVP Water Use (in acre-feet)	13,500	14,690[1]	5,800	6,310[1]
Irrigated Lands (in acres)	5,960	5,890	4,690	4,640

Source: CH2M Hill 2000, Dornbusch & Company 2000
1 CVP water use increases in a dry year relative to an average year to offset anticipated reduction in ground-water pumping in dry years.

Alternative 1

Alternative 1 is assumed to have effects on agricultural water costs and associated land and water use, gross value of production, and farm net revenues for the affected water districts similar to the No Action Alternative. Therefore, there would be no incremental effects on these elements compared to the No-Action Alternative as a result of this alternative.

Alternative 2

Table 4.3-18 presents the "theoretical" 1999 tiered rates for CVP agricultural water for BVWD and CCCSD had the 1999 published rates been revised based on the rate-setting methodology proposed under Alternative 2. For comparison, the table also shows the actual published 1999 agricultural cost-of-service rate for each district (No Action). The table shows that the impact of Alternative 2 on CCCSD CVP agricultural cost-of-service water rates (about 20 percent) would be much lower than the impact on its CVP M&I cost-of-service water rates. At the same time, Alternative 2 would cause BVWD CVP agricultural water cost-of-service rate to increase by about 45 percent from the cost under the No Action Alternative. It should be noted that these rate comparisons account for the potential additional impacts on rates of the Category 1/Category 2 rate-setting measure also stipulated under Alternative 2, and that would not be implemented under the No Action Alternative.

TABLE 4.3-18
1999 PUBLISHED AND "THEORETICAL" COST-OF-SERVICE AGRICULTURAL RATES ASSUMING 80-10-10 TIERED PRICING

	No Action Alternative 1999 CVP Agricultural Water Rates	Alternative 2 "Theoretical"1999 CVP Agricultural Water Rates		
Water District	**Cost-of-Service ($/acre-foot)**	**Cost-of-Service Rate ($/acre-foot)**	**Midpoint[1] ($/acre-foot)**	**Full-Cost Rate ($/acre-foot)**
CVP Contractor	1st Tier (80 percent)	1st Tier (80 percent)	2nd Tier (10 percent)	3rd Tier (10 percent)
BVWD	$22.89	$32.02	$53.85	$75.67
CCCSD	$18.21	$21.68	$30.17	$38.66

Source: Bureau of Reclamation 1999b, Dornbusch & Company 2000
1 Midpoint estimated as the simple average of the cost-of-service and full-cost rates.

Tables 4.3-19 and 4.3-20 present the estimated potential maximum incremental water cost and land use impacts under Alternative 2 for BVWD and CCCSD, respectively. Table 4.3-19 indicates that implementation of Alternative 2 could cause as much as 800 acres of BVWD irrigated pastureland in the projected contract year 25 to be fallowed during a year of average hydrologic conditions (and even more under dry hydrologic conditions). The table also shows that in contract year 25 (2029), assuming average hydrologic conditions, BVWD farmers may reduce their use of CVP agricultural water by as much as 7,550 acre-feet, or more than half their 13,500 acre-feet of projected use under the No Action Alternative. The fallowing of land and the reduction in the amount of water applied to lands that would remain under irrigation under Alternative 2 could reduce the annual gross value of agricultural production within the BVWD by approximately 6 percent (or $120,000 in 1999 dollars) and the net income realized by farmers by as much as $130,000 in 1999 dollars under average hydrologic conditions. In a dry year, the decline in gross production value and net revenue impacts could climb to $180,000 and $260,000 (in 1999 dollars)

respectively. The projected maximum agricultural land and water use, gross value of production, and net revenue impacts for CCCSD under Alternative 2 are presented in Table 4.3-20.

TABLE 4.3-19
PROJECTED YEAR 2029 AGRICULTURAL ECONOMIC AND LAND USE IMPACTS, BELLA VISTA WATER DISTRICT

Factor (Based on 1999 Dollars)	No Action Alternative	Alternative 2 Maximum Incremental Change from No Action Alternative	No Action Alternative	Alternative 2 Maximum Incremental Change from No Action Alternative
	Average Hydrologic Condition	Average Hydrologic Condition	Dry Hydrologic Condition	Dry Hydrologic Condition
Gross Value of Production (Million$)	$1.95	($0.12)	$1.95	($0.18)
Fallowed Land	($0.06)			($0.06)
Groundwater Pumping	0.00			(0.06)
Irrigation Cost	0.14			0.14
CVP Untreated Water Cost	(0.21)			(0.28)
Crop Prices	0.00			0.00
Net Revenue Impact	($0.13)			($0.26)
Projected Year 2020				
CVP Water Use (acre-feet)	13.50	(7.55)	14.69	(9.44)
Irrigated Land (acres)	5,960	(800)[1]	5,890	(1,160)[1]

Source: CH2M Hill 2000, Bureau of Reclamation 1996, Dornbusch & Company 2000
1 Projected to be almost entirely pasture.

TABLE 4.3-20
PROJECTED YEAR 2029 AGRICULTURAL ECONOMIC AND LAND USE IMPACTS, CLEAR CREEK COMMUNITY SERVICES DISTRICT

Factor (Based on 1999 Dollars)	No Action Alternative	Alternative 2 Maximum Incremental Change from No Action Alternative	No Action Alternative	Alternative 2 Maximum Incremental Change from No Action Alternative
	Average Hydrologic Condition	Average Hydrologic Condition	Dry Hydrologic Condition	Dry Hydrologic Condition
Gross Value of Production (Million$)	$4.58	($0.08)	$4.58	($0.12)
Fallowed Land	($0.04)			($0.04)
Groundwater Pumping	0.00			(0.04)
Irrigation Cost	0.06			0.06
CVP Untreated Water Cost	(0.09)			(0.19)
Crop Prices	0.00			0.00
Net Revenue Impact	($0.07)			($0.14)
Projected Year 2020				
CVP Water Use (Acre-feet)	5.80	(3.25)	6.31	(4.06)
Irrigated Land (acres)	4,690	(510)[1]	4,640	(740)[1]

Source: CH2M Hill 2000, Bureau of Reclamation 1996, Dornbusch & Company 2000
1 Projected to be almost entirely pasture.

4.3.4 CUMULATIVE EFFECTS ON THE REGIONAL ECONOMY

No Action Alternative

Table 4.3-21 summarizes projected year 2029 industrial output, employment in terms of full-time equivalent jobs (FTE), and income by place of work (POW) for Shasta County under the No Action Alternative. Consistent with the PEIS, the figures are presented in 1991 dollar terms.

TABLE 4.3-21
ESTIMATED YEAR 2029 OUTPUT, EMPLOYMENT, AND INCOME BY PLACE-OF-WORK, SHASTA COUNTY (1991 DOLLARS)

Industrial Sector	Output (Million$)	Employment (FTE Jobs)	Income POW (Million$)
Agriculture	$131.01	2,341	$61.21
Mining	$497.41	272	$419.96
Construction	$604.27	6,746	$200.61
Manufacturing	$684.30	5,270	$258.51
Transportation	$478.04	4,115	$246.69
Trade	$583.29	16,584	$334.53
Fire	$594.89	6,100	$373.84
Services	$808.69	18,751	$469.00
Government	$360.44	11,404	$331.23
Total	**$4,742.35**	**71,579**	**$2,695.62**

Source: Minnesota Implan Group 1994; Dornbusch & Company 2000.

Alternative 1

Alternative 1 is assumed to have effects on output, employment, and income in Shasta County similar to the No Action Alternative. Therefore, there would be no incremental effects on these elements under Alternative 1.

Alternative 2

Table 4.3-22 summarizes the contract year 25 (2029) sector-specific and total anticipated maximum incremental impacts on industrial output within Shasta County under Alternative 2. These impacts would result from the escalation of CVP M&I water rates as well as increased CVP agricultural water rates and acreage limitations and the associated changes in land use, farmer net income, and gross value of agricultural production. The table indicates that if Alternative 2 were implemented, the county's total industrial output could decrease by as much as $3.3 million in 1991 dollars when compared to baseline No Action levels (less than 0.1 percent). The table also shows that the impacts on the county's agricultural sector would be larger, at approximately negative 0.2 percent.

TABLE 4.3-22
YEAR 2029 SHASTA COUNTY OUTPUT IMPACTS UNDER ALTERNATIVE 2
(1991 COMPARATIVE BASIS)

	No Action Alternative	Alternative 2	
Industrial Sector	**Average Condition (Millions$)**	**Incremental Change from No Action Maximum (Millions$)**	**Incremental Change from No Action Maximum (%)**
Agriculture	$131.01	-0.28	-0.21%
Mining	497.41	-0.04	-0.01%
Construction	604.27	-0.04	-0.01%
Manufacturing	684.30	-0.59	-0.09%
Transportation	478.04	-0.30	-0.06%
Trade	583.29	-0.53	-0.09%
Finance, Insurance & Real Estate	594.89	-0.62	-0.10%
Services	808.69	-0.81	-0.10%
Government	360.44	-0.10	-0.03%
Total	**$4,742.35**	**-3.31**	**-0.07%**

Sources: Minnesota Implan Group 1994, Dornbusch & Company 2000.

Table 4.3-23 summarizes the contract year 25 (2029) sector-specific and total anticipated maximum incremental impacts on employment Shasta County under Alternative 2. The table indicates that the county's agricultural employment could decrease by about 5 jobs, or 0.2 percent from baseline No Action levels under Alternative 2. Overall, the county economy could see a decrease of as many as 46 jobs if Alternative 2 is implemented.

TABLE 4.3-23
YEAR 2029 SHASTA COUNTY EMPLOYMENT IMPACTS UNDER ALTERNATIVE 2
(1991 COMPARATIVE BASIS)

	No Action Alternative	Alternative 2	
Industrial Sector	**Average Condition (FTE Jobs)**	**Incremental Change from No Action Maximum (FTE Jobs)**	**Incremental Change from No Action Maximum (%)**
Agriculture	2,341	-5.3	-0.23%
Mining	272	0.0	0.00%
Construction	6,746	-0.6	-0.01%
Manufacturing	5,270	-2.4	-0.05%
Transportation	4,115	-2.1	-0.05%
Trade	16,584	-11.9	-0.07%
Finance, Insurance & Real Estate	6,100	-5.4	-0.09%
Services	18,751	-17.9	-0.10%
Government	11,404	-0.7	-0.01%
Total	**71,579**	**-46.3**	**-0.06%**

Source: Minnesota Implan Group 1994, Dornbusch & Company 2000.

Table 4.3-24 summarizes the contract year 25 (2029) sector-specific and total anticipated maximum incremental impacts on income by POW within Shasta County under Alternative 2. The table indicates

that the region's income by POW could decrease by almost $1.9 million or 0.7 percent from baseline No Action levels under Alternative 2 (in 1991 dollar terms).

TABLE 4.3-24
YEAR 2029 IMPACTS ON SHASTA COUNTY INCOME BY PLACE OF WORK UNDER ALTERNATIVE 2 (1991 COMPARATIVE BASIS)

Industrial Sector	No Action Alternative	Alternative 2	
	Average Condition (Million$)	Incremental Change from No Action Maximum (Million$)	Incremental Change from No Action Maximum (%)
Agriculture	$61.21	-$0.19	-0.31%
Mining	419.96	-0.03	-0.01%
Construction	200.61	-0.01	0.00%
Manufacturing	258.51	-0.22	-0.09%
Transportation	246.69	-0.15	-0.06%
Trade	334.53	-0.30	-0.09%
Finance, Insurance, and Real Estate	373.84	-0.39	-0.10%
Services	469.00	-0.47	-0.10%
Government	331.23	-0.09	-0.03%
Total	**$2,695.62**	**-$1.87**	**-0.07%**

Sources: Minnesota Implan Group 1994; Dornbusch & Company 2000.

Table 4.3-25 summarizes the anticipated land use, water cost, and economic impacts of Alternative 1 for the Shasta and Trinity River Division Contractors. These impacts would have subsequent regional economic impacts within Shasta County, as presented in Tables 4.3-21 through 4.3-24 above.

TABLE 4.3-25

LAND USE, WATER COST, AND AGRICULTURAL ECONOMIC IMPACTS SUMMARY AVERAGE HYDROLOGIC CONDITION

Factor	No Action Alternative	Incremental Change From No-Action Conditions	
		Alternative 1	Alternative 2 Maximum Impact
CVP M&I Water Cost ($000s)	$1,100	No Change	$1,769
Irrigated Land Use (000s acres)	10.65	No Change	(1.3)
Gross Value of Production (Millions $)	$6.53	No Change	($0.2)
Net Value of Production (Millions $)	N/A	No Change	($0.2)
Annual CVP M&I Water Use Affected by Contract Renewal (acre-feet)	30.22	No Change	No Change
Annual CVP M&I Water Use Affected by Contract Renewal (acre-feet)	19.1	No Change	(10.8)

Source: Dornbusch & Company 2000

4.4 LAND USE

4.4.1 AFFECTED ENVIRONMENT

This characterization of the affected environment for land use is based on information provided in Shasta County Water Resources Master Plan Phase 1 Report – Current and Future Water Needs (October 1997). This analysis was prepared by SCWA in partnership with CH2M Hill. The California Department of Water Resources (DWR) provided land use information (collected in 1995) that is the basis for the acreages presented in this report. More than 90 percent of the Contractor service areas (i.e., boundaries of the Shasta and Trinity River Divisions) are included within the 260,000-acre Redding Groundwater Basin. Land use data are presented for the Redding Groundwater Basin as a whole (these data are not segregated by individual Contractors). Acreages reported for the Redding Groundwater Basin include areas that are outside the Contractor service areas and that have a higher percentage of farmland than the Contractor service areas, but are otherwise similar.

- City of Redding Draft Background Report (July 1998). This analysis was prepared by the City of Redding and various consultants, and contains land use information for the sphere of influence considered by the City of Redding in updating its General Plan.
- City of Redding Public Hearing Draft General Plan (March 2000), prepared by the City of Redding.
- Shasta County General Plan, as amended through October 1998, prepared by the Shasta County Department of Resource Management.
- City of Shasta Lake Existing Conditions Report (February 1999), prepared by the City of Shasta Lake.
- Bella Vista Water District Water Conservation Plan (January 1995), prepared by the BVWD. Supplemental information provided by the district in informal correspondence (November 1999 "Draft") also was incorporated.
- Clear Creek Community Services District Water Conservation Plan (November 1994), prepared by the CCCSD. Supplemental information provided by the district in informal correspondence (Water Conservation Plan Demand Analysis, Attachments 2 and B, dated March 19, 1999) also was incorporated.
- City of Shasta Lake Water Conservation Plan (March 1994), prepared by the City of Shasta Lake.
- City of Redding Water Conservation Plan (undated, assume 1994), prepared by the City of Redding.

Existing Land Uses

Existing land uses in Shasta County and the Redding Groundwater Basin are shown in Table 4.4-1. As shown, Shasta County encompasses approximately 2.5 million acres. Approximately 6 percent of the

county land base consists of water-using land. Approximately ~~2~~ two percent of the total land base is urban/rural urban (water-and non-water using combined). In the Redding Groundwater Basin, where development is more concentrated, approximately 21 percent is water-using land, and 18 percent is urban/rural urban (water- and non-water using combined). The remaining lands are non-water use lands that are in native vegetation or "idle" status. The predominant agricultural water use in both Shasta County and in the Redding Groundwater Basin is pasture irrigation. Non-water use areas are divided into three subcategories: native, idle, and rural urban non-irrigated (1 to 5 acres).

TABLE 4.4-1
SHASTA COUNTY AND REDDING GROUNDWATER BASIN LAND USES (ACRES)

Category	Shasta County	Redding Basin
Water-Using Lands – Irrigated Agriculture		
Permanent Crops	2,960	2,487
Grain Field Crops	5,308	1,572
Pasture	48,998	16,187
Truck	989	337
Rice	2,941	0
Rural Urban (1 to 5 acres)	2,672	2,672
Total	**63,868**	**23,255**
Urban		
Urban	26,945	18,224
Rural Urban Domestic (1 to 5 acres)	5,375	4,632
Total	**32,320**	**22,856**
Commercial and Industrial		
Commercial	2,066	1,326
Industrial	3,556	2,844
Total	**5,622**	**4,170**
Recreation and Environmental		
Water Bodies	43,051	1,696
Parks and Golf Courses	714	490
Riparian Vegetation	5,467	2,799
Total	**49,232**	**4,985**
Total Water Use Areas	**151,042**	**55,266**
Non-Water Use Lands		
Native	2,277,486	178,836
Idle	11,031	1,886
Rural Urban Non-Irrigated (1 to 5 acres)	27,777	23,571
Total Non-Water Use Areas	**2,316,294**	**204,293**
Gross Land Use Area	**2,467,336**	**259,559**

Countywide, approximately 0.2 percent of the land base is used for commercial and industrial purposes, 0.2 percent is used for recreation and environmental purposes, and 3 percent is irrigated agriculture. The predominant water-using land use in Shasta County is agriculture. Ninety-three percent of the land base in Shasta County is classified as non-water use land.

The Redding Groundwater Basin accounts for approximately 11 percent of the total Shasta County land base. About 2 percent of the Redding Groundwater Basin is commercial and industrial, approximately 0.2 percent is used for recreation and environmental purposes, and nearly 3 percent is irrigated agriculture. Urban/rural urban development is proportionately the most significant land use in the Redding Groundwater Basin. Nearly 70 percent of the land base in the Redding Groundwater Basin is non-water using land.

Urban development is concentrated in the south central portion of the county in the cities of Redding, Anderson, and Shasta Lake. Approximately 84 percent of the populous of Shasta County resides in these communities (Shasta County General Plan 1998). All of these areas receive Shasta and Trinity River Project water supplies except Anderson. The City of Anderson is not affected by the scope of this document and is therefore not specifically addressed.

TABLE 4.4-2
EXISTING LAND USE DESIGNATIONS
CITY OF REDDING AND CITY OF SHASTA LAKE (Acres)

Land Use Designation	City of Redding*	City of Shasta Lake
Residential	35,559	5,151
Retail	1,414	71
Service Commercial	1,143	NA
Highway Commercial	239	NA
Office	607	NA
Office Residential	168	NA
Commercial**	NA	340
Industrial	4,484	848
Airport Service	1,215	NA
Mineral Resources	NA	26
Park	1,342	128
Public Facility/Institution	1,895	178
Greenway	15,156	NA
Agriculture	631	NA
Federal Government	NA	201
TOTAL	**63,490**	**6,943**

Source: City of Redding Draft Background Report (1998); City of Shasta Lake General Plan Existing Conditions Report (1999)
* Redding General Plan Area (not city limits)
** City of Shasta Lake does not differentiate commercial acreage use.

The BVWD encompasses 34,016 acres (53.2 square miles), with service provided to 4,776 connections. Of these connections, 534 receive water for agricultural use. Also of these 4,776 total connections, 4,608 are serviced by meters that are suited to typical residential lots (i.e., 3/4-inch) or mid-sized acreage (i.e., 1-5 acres). There were 30-full time farms operating in 1997. Water for agricultural use is delivered to 6,151 acres of land. Of this total, 3,550 acres are irrigated (includes aquaculture). Most of the irrigated land is cropped to pasture (2,813 acres, 79 percent of total irrigated land). Grains, alfalfa and fruits account for 880 irrigated acres (25 percent of total irrigated land) (data inconsistency noted).

During the last 10 to 12 years, there has been a general trend toward lower crop production and an increase in the acreage of irrigated pasture in the BVWD. The acreage planted in fruits and nuts has steadily declined, while oat, alfalfa, and nut production has been variable. The cumulative total water consumption by residential, commercial, and rural users (defined by the BVWD to be users that irrigate in larger than residential quantities of water, with the irrigated area typically being less than 2 acres, that

do not meet Federal requirements for agricultural water use) has increased from 16 percent of the total 1988 consumption to 40 percent of the total 1997 consumption.

During the period from 1988 to 1993, M&I water consumption in the BVWD increased by approximately 130 percent, from 2,261 acre-feet per year to 5,219 acre-feet per year. Agricultural water consumption during the same time period decreased by almost 60 percent, from 11,628 acre-feet per year to 6,652 acre-feet per year. In 1989, the number of M&I connections was 2,493, and in 1993 there were 3,684 connections. This represents a 43 percent increase between 1989 and 1993. This shift in cropping pattern and water consumption away from agricultural uses and toward residential, commercial, and rural uses is attributable to urbanization of the westerly portion of the BVWD, which is within the sphere of influence of the city of Redding.

The CCCSD encompasses 14,314 acres (22.4 square miles) with service provided to 2,498 connections. Of these connections, 788 receive water for agricultural use, and 1,551 are connections that provide water for M&I use. Water for agricultural irrigation (including aquaculture) is delivered to approximately 4,470 acres (data for 1989, provided March 19, 1999). Most of the irrigated land is cropped to pasture (2,161 acres, 48 percent of total agricultural irrigated land). Other irrigated crops (e.g., deciduous orchards, alfalfa, firewood/Christmas trees, miscellaneous field crops, etc.) account for 2,309 irrigated acres (52 percent of total agricultural irrigated land). About 2,640 acres of land that is capable of receiving water for agricultural use was not under a crop rotation (i.e., was fallow) in 1989.

The City of Shasta Lake encompasses 7,024 acres (11 square miles) with service provided to 3,773 connections. All of the service connections are for M&I uses, and there are no agricultural land uses within the Contractor service area.

The City of Redding encompasses 59,044 acres, with service provided to 24,889 connections. The City delivers water obtained under the CVP contract throughout the “Buckeye zone” service area, which includes about 4,237 connections. Most of these connections are within the city limits (included within the above-referenced 22,704 connections city-wide), but a few of the connections that receive water under the CVP contract are outside the city limits. All of the City of Redding deliveries of CVP water are for M&I uses, although the City’s General Plan designates 631 acres as agriculture.

Additional historical land and water usage data specific to other Contractors were not available, except as previously described.

Projected Future Land Use

The cities of Redding and Shasta Lake, and Shasta County have each adopted General Plans to guide future development and land uses within their respective spheres of influence. As indicated in each of the plans, projected population growth trends are expected to continue at approximately 1.5 percent to 2.2 percent per year, based on historic and predicted conditions.

The City of Redding projects a 21 percent increase in single- and multiple-family dwellings between the years 2000 and 2010, or 2.1 percent per year. The number of acres required to support housing development during these years is projected to increase by 21 percent, from 902 acres per year at present to 1,092 acres per year in 2010.

The acreage of agricultural land use the CCCSD is projected to increase by 45 percent (from 7,110 acres to 10,325 acres) during the period 1989 through 2026 (Water Conservation Plan Demand Analysis, Attachments 2 and B, dated March 19, 1999). Acreages for all crops except miscellaneous field crops and nursery/lettuce are anticipated to increase. Anticipated increases range from 10 percent (alfalfa) to 300 percent (subtropical orchards). The acreage of irrigated pasture is anticipated to increase by 120 percent, from 2,161 acres (1989) to 4,500 acres (2025). During this period, the acreage of fallow land is projected to increase by 12 percent, from 2,640 acres to 2,950 acres.

Additional projections of future land and water usage specific to other Contractors were not available, except as previously described.

4.4.2 Environmental Consequences

No Action Alternative

Because renewal of the long-term contracts would not involve the construction of any physical facilities and structures, the No Action Alternative would not have a direct effect on land use. Additionally, implementation of the No Action Alternative would not conflict with any adopted land use plan. The No Action Alternative would also not cause indirect effects on M&I land use.

Indirect economic effects on agricultural land use could occur under the No Action Alternative due to rewording to provide water service to parcels that are less than or equal to 5 acres as M&I water instead of agricultural water. Under the rewording, Reclamation's Contracting Officer would seek verification that the use is agricultural. Two Contractors in the Division are designated to receive CVP agricultural water (i.e., BVWD and CCCSD). If the use is determined to be agricultural on parcels less than or equal to 5 acres, there would be no indirect effect of the No Action Alternative. Indirect effects, such as reduced agricultural production, could occur if the 2- to 5-acre tracts are currently inappropriately designated as agricultural.

In 1996, a total of 7,319 acres of land within the two districts that are designated for CVP agricultural water use were irrigated with CVP water: 3,388 acres in the BVWD and 3,931 acres in the CCCSD. Under the No Action Alternative for the BVWD, the irrigated acreage is assumed to increase to 5,960 acres and 5,890 acres for the average and dry conditions, respectively. Under the No Action Alternative for the CCCSD, the irrigated acreage is assumed to increase to 4,690 acres and 4,640 acres for the average and dry conditions, respectively. (See also Table 4.3-17.)

Alternative 1

Alternative 1 is assumed to have direct and indirect effects on land use similar to those of the No Action Alternative. There would be no incremental environmental effects on land use under this alternative.

Alternative 2

Alternative 2 is assumed to have direct effects on land use similar to those of the No Action Alternative. There would be no incremental direct environmental effects on land use under this alternative.

Regarding indirect effects, implementation of Alternative 2 could cause a slight retraction of the regional economy and a consequent effect on M&I land use. A retraction of the regional economy would be expected to delay implementation or reduce the scale of land uses that rely on M&I water deliveries. Regional economic impacts would be small compared to the normal inter-year variation, so impacts on non-agricultural land uses are expected to be small. Otherwise, Alternative 2 is assumed to have indirect effects on M&I land use similar to those of the No Action Alternative. There are no other incremental indirect effects on M&I land use under this alternative.

Under Alternative 2, indirect effects on agricultural land use due to rewording to provide water service to parcels that are less than or equal to 5 acres as M&I water instead of as irrigation water are assumed to be similar to those anticipated under the No Action Alternative. There would be no incremental indirect effects due to rewording under this alternative if 2 to 5 acre tracts now receiving agricultural rates are truly used for agriculture, as those tracts would continue to qualify for agricultural rates.

Nonetheless, for Contractors that deliver agricultural water (i.e., BVWD and CCCSD), the increase in agricultural rates could cause fallowing of lands with implementation of Alternative 2 relative to the No Action Alternative. Almost all of the additional fallowed lands are projected to be taken out of pasture. The incremental acreages that may be fallowed in 2029 under Alternative 2 versus the No Action Alternative are presented for the BVWD (average and dry conditions) in Table 4.3-19. These projections are presented for the CCCSD in Table 4.3-20.

As shown in Table 4.3-19, for the BVWD, implementation of Alternative 2, with its increases in agricultural rates, could result in increased fallowing (relative to the No Action Alternative) of about 800 acres in 2029 under average conditions and could result in increased fallowing of about 1,160 acres under dry conditions. These values represent 13 percent and 20 percent reductions, respectively, in the irrigated acreages that are assumed to occur relative to the No Action Alternative under average and dry conditions.

As shown in Table 4.3-20, for the CCCSD, implementation of Alternative 2, with its increases in agricultural rates, could result in increased fallowing (relative to the No Action Alternative) of about 510 acres in 2029 under average conditions and could result in increased fallowing of about 740 acres under dry conditions. These values represent 11 percent and 16 percent reductions, respectively, in the irrigated acreages that are assumed to occur relative to the No Action Alternative under average and dry conditions. In other words, a shift from agricultural to M&I rates will have no effect if 2- to 5-acre parcels are really agricultural, but the increase in agricultural rates will have an effect.

4.4.3 CUMULATIVE EFFECTS

Cumulative effects to land use would occur in the form of increased fallowing. Almost all of the additional fallowed lands would be taken out of pasture. For the BVWD, about 1,160 additional acres could be fallowed in 2029 under dry conditions under Alternative 2 versus the No Action Alternative, as

shown in Table 4.3-19. For CCCSD, fallowing could occur on about 740 acres under dry conditions as shown in Table 4.3-20. Of the 38,998 acres of pasture in Shasta County, these fallowed areas represent less than 5 percent of pasture in Shasta County. Therefore, implementation of either Alternative 1 or 2 would result in only minor changes to land use.

4.5 BIOLOGICAL RESOURCES

4.5.1 AFFECTED ENVIRONMENT

This characterization of the affected environment for biological resources is based on information provided in *the Biological Assessment/Essential Fish Habitat Assessment for the Shasta and Trinity River Divisions Long-Term Contract Renewal (August 2003), including:*

- California Native Plant Society Electronic Inventory of Rare and Endangered Vascular Plants of California. This comprehensive database maintained by the California Native Plant Society contains statewide sighting records of special-status plant species.
- California Department of Fish and Game Natural Diversity Database (Rarefind) Version 2.1.2c. (2003). This state-maintained database provides statewide sighting information for special-status wildlife species.
- The U.S. Fish and Wildlife Service (USFWS) list of Endangered and Threatened Species That May Occur in or Be Affected by Projects in Shasta County (USFWS 2000a; Reference File No. 00-SP-2414). This list was updated on June 27, 2003 (http://sacramento.fws.gov).
- California Department of Fish and Game's Endangered and Threatened Animals of California (CDFG 2002b) and State and Federally Listed Endangered, Threatened, and Rare Plants of California (CDFG 2002a). These comprehensive statewide lists of special-status species were consulted to determine which species would potentially occur in Shasta County.
- City of Redding Draft Background Report (July 1998). This analysis was prepared by the City of Redding and various consultants, and contains information regarding existing habitat classifications and special-status plant and wildlife species.
- City of Shasta Lake General Plan Existing Conditions Report (February 1999). This analysis, prepared by Diaz Associates, provided information regarding existing habitat classifications and special-status plant and wildlife species.
- Bella Vista Water District Water Conservation Plan (January 1995), prepared by the BVWD. The plan was reviewed for special-status plant and wildlife information.
- City of Redding Water Conservation Plan (undated, assumed 1994), prepared by the City of Redding. The plan was reviewed for special-status plant and wildlife information.
- City of Shasta Lake Water Conservation Plan (March 1994), prepared by the City of Shasta Lake. The plan was reviewed for special-status plant and wildlife information.
- Clear Creek Community Services District Water Conservation Plan (November 1994), prepared by the CCCSD. The plan was reviewed for special-status plant and wildlife information.

Habitat Types and Communities Within the Shasta and Trinity River Divisions

The Redding Basin is a hydrologic subbasin of the Sacramento River Basin, as defined by the California Department of Water Resources (Shasta County Water Agency et al. 1997). More than 90 percent of the Study Area (i.e., within the boundaries of the Shasta and Trinity River Divisions) is included within the 260,000-acre Redding Basin. The Redding Basin supports a diverse range of vegetation types and numerous wildlife species, and there are vegetation and wildlife resources that could be affected by the proposed contract renewals.

Eleven habitat types occur within the Study Area:

- Annual grassland
- Blue oak/grey pine
- Blue oak woodland
- Cropland
- Lacustrine and other aquatic communities
- Riparian
- Ponderosa pine
- Klamath mixed conifer
- Sierran mixed conifer
- Vernal pool
- Urban

A description of each habitat type and associated wildlife species is provided in Table 4.5-1.

Table 4.5-1
Habitat Types and Communities Occurring within the
Shasta and Trinity River Divisions

Habitat Type	Characteristics
Annual Grassland (AGS)	Annual grassland habitat consists of open grasslands composed primarily of introduced annual grasses. Vernal pools often occur as inclusions within this habitat type. Cropland is commonly cultivated within this habitat type. Annual grasslands are distributed throughout the study area, often interspersed among oak woodlands. The seed crops produced in this habitat type are crucial for insects, birds, and grain-eating mammals, as well as species that prey upon them. Predators include coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), hawks, white-tailed kite (*Elanus caeruleus*), and owls. This habitat is capable of supporting burrowing owls (*Athene cunicularia*) and other denning mammals. This is a favored habitat for mule deer. Special-status species associated with annual grasslands include American peregrine falcon and Swainson's hawk.
Blue Oak/Grey Pine (BOP)	This habitat is usually diverse in structure, with a mix of hardwoods, conifers, and shrubs. Within the project study area, the understory is primarily AGS. Blue oaks and grey pines dominate the overstory; blue oak is usually most abundant. Vernal pools often occur as inclusions in this habitat type. Cropland may be included within the AGS habitat component of this habitat type. The project area supports a combination of woodlands, including valley oak (*Quercus lobata*), blue oak (*Q. douglasii*), and blue oak/grey pine (*Pinus sabiniana*). Woodland types transition, as listed above, from valley floor to low foothills. Tree densities vary across the landscape. Woodland habitat is structurally complex and diverse, and important to a variety of wildlife species, particularly grey squirrel (*Sciurus carolinensis*), mule deer (*Odocoileus hemionus*), bats, California quail (*Callipepla californica*), and woodpeckers. Special-status species associated with woodland habitat include American peregrine falcon, northern spotted owl, and Shasta salamander (*Hydromantes shastae*).
Blue Oak Woodland (BOW)	Blue oak dominates this habitat type. Generally, these woodlands have an overstory of scattered trees, often forming open, savannah-like stands on dry ridges or gentle slopes. On certain sites, the canopy can be nearly closed. Vernal pools and annual grasslands commonly occur as inclusions within this habitat type. Cropland may be included within the AGS habitat component of this habitat type. Similar to BOP habitat, species common to blue oak woodlands include grey squirrel, mule deer, bats, California quail, and woodpeckers. Special-status species include American peregrine falcon and Shasta salamander.
Cropland (CRP)	Vegetation in this habitat type includes a variety of cultivated plants varying in size, shape, and growing patterns. Cropland habitats do not conform to normal habitat stages. Instead, cropland is regulated by the crop cycle in California. Cropland commonly occurs as an inclusion in AGS habitat, which in turn is commonly an inclusion in BOP and BOW habitats. These habitats may occur in association with irrigated pasture. Wildlife species that frequent agricultural areas vary with crop type and season, but may include red-winged blackbird ((*Agelaius phoeniceus*), American crow (*Corvus brachyrhynchos*), black-tailed jack rabbit, California ground squirrel (*Spermophilus beecheyi*), burrowing owl, and various predators. Pasturelands are usually a mix of perennial grasses and legumes that normally provide 100 percent cover. Pheasant, quail, and red-winged blackbirds commonly nest in pasture habitat, or in brushy or lightly wooded pasture margins. Listed species associated with these habitat types include bald eagle, Swainson's hawk, and greater sandhill crane.

Table 4.5-1
Habitat Types and Communities Occurring within the
Shasta and Trinity River Divisions

Habitat Type	Characteristics
Lacustrine (LAC) and other aquatic communities	Aquatic communities include rivers, streams, lakes, and ponds. These communities provide important wildlife habitat for waterfowl, osprey (*Pandion haliaetus*), bald eagle, belted kingfisher (*Ceryle alcyon*), grebes, frogs, and northwestern pond turtles (*Clemmys marmorata marmorata*). Numerous species of insects reproduce and live in these communities, providing a significant prey base. Many predaceous birds and mammals forage in these communities and use river and stream corridors as travelways or for migration and dispersal. Special-status species associated with lacustrine and other aquatic habitats include bald eagle, American peregrine falcon, bank swallow, and California red-legged frog.
Riparian (RIP)	Riparian communities are found along watercourses in the area and are one of the most valuable habitats in California, providing food, cover, and nesting habitat, thermal refuge, and migration and dispersal corridors. Common associates include valley oak, California sycamore (*Platanus racemosa*), Fremont's cottonwood (*Populus fremontii*), willow (*Salix* sp.), and elderberry (*Sambucus* sp.). The study area has significant stands of Sacramento River riparian vegetation providing habitat for approximately 250 species of wildlife. Statewide, only 5 percent of the historical acreage of river riparian vegetation remains. Mammals commonly found in riparian areas include ringtail (*Basariscus astutus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and grey fox. Birds species found in riparian areas commonly include red-shouldered hawk (*Buteo lineatus*), wood duck (*Aix sponsa*), great blue heron (*Ardea herodias*), yellow warbler (*Dendroica petechia*), and black-crowned night heron (*Nycticorax nycticorax*). Amphibians such as Pacific tree frogs (*Pseudacris regilla*) and bullfrogs (*Rana catesbiana*) are commonly abundant. Reptiles include Pacific gopher snake (*Pituophis melanoleucus catenifer*) and garter snakes (*Thamnophis* sp.) Listed species associated with valley foothill riparian habitat include bald eagle, American peregrine falcon, western yellow-billed cuckoo, California red-legged frog, and valley elderberry longhorn beetle.
Ponderosa Pine (PPN)	At least 50% of a stand must be ponderosa pine to be classified ponderosa pine habitat. Within the project study area, the most common associated tree species include other conifers and various oak species. Shrubs such as manzanita and ceanothus, and various grasses and forbs are also common associates. Species commonly found in ponderosa pine habitat include mountain quail (*Oreortyx pictus*), sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk (*Buteo jamaicensis),* long-eared owl (*Asio otus*), Virginia opossum (*Didelphis virginiana*), western spotted skunk (*Spilogale gracilis*), and black bear (*Ursus americanus*). Listed species associated with ponderosa pine habitat include bald eagle and American peregrine falcon.
Klamath mixed conifer (KMC)	Stands of Klamath mixed conifer habitat are typically tall, dense to moderately open and consist of a mixture of conifers. Dominant conifers typically include white fir (*Abies concolor*), Douglas-fir, ponderosa pine, incense cedar (*Calocedrus decurrens*), and sugar pine (*Pinus lambertiana*). Dense forests have a very rich shrub layer, which can include Sierra laurel (*Leucothoe davisiae*), Sadler oak (*Quercus sadleriana*), dwarf rose (*Rosa gymnocarpa*), and western thimbleberry (*Rubus parviflorus*). Species commonly found in Klamath mixed conifer habitat include mountain quail, sharp-shinned hawk, long-eared owl, western red bat (*Lasiurus blossevillii*), western gray squirrel, gray fox, and black bear. Listed species associated with Klamath mixed conifer habitat include northern spotted owl, American peregrine falcon, and California wolverine (*Gulo gulo*).
Sierran mixed conifer (SMC)	The Sierran mixed conifer habitat is an assemblage of conifer and hardwood species that form closed, multilayered canopies with nearly 100 percent overlapping cover. Dominant species include white fir, Douglas-fir, ponderosa pine, sugar pine, incense-cedar, and California black oak. Deerbrush (*Ceanothus integerrimus*), manzanita, chinquapin (*Chrysolepis chrysophylla*), bitter cherry (*Prunus emarginata*), gooseberry (*Ribes amarum*), and mountain misery (*Chamaebatia foliosa*) are common shrub species. Listed species that inhabit Sierran mixed conifer habitat include northern spotted owl and bald eagle.

Table 4.5-1
Habitat Types and Communities Occurring within the
Shasta and Trinity River Divisions

Habitat Type	Characteristics
Vernal pool (VP)	Vernal pools are seasonally wet areas where water temporarily ponds due to an underlying impervious rock or clay layer. This habitat type typically occurs as an inclusion in other habitats, most commonly within AGS or CRP habitat. These two habitat types commonly occur within BOP or BOW habitat in the project study area. Vernal pools support species such as the western spadefoot toad (*Scaphiopus hammondii*), and various frog species. Special-status species associated with vernal pool habitat include greater sandhill crane, vernal pool tadpole shrimp, vernal pool fairy shrimp, Greene's tuctoria, Slender Orcutt grass, and Boggs Lake hedge-hyssop.
Urban (URB)	Urban habitat includes five types of vegetative structure: tree grove, street strip, shade tree/lawn, lawn, and shrub cover. A distinguishing feature of urban habitat is the mixture of native and exotic species. Both native and exotic species are valuable, with exotic species providing a good source for additional food in the form of fruits and berries. In the project area, urban habitat may have supplanted any of the habitats listed above. Urban vegetation is frequented by more disturbance-tolerant species such as northern mockingbird (*Minus polyglottos*) American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), California ground squirrel, Pacific tree frog, opossum ((*Didelphis virginiana*), and western toad (*Bufo boreas*).

Source: North State Resources 2003

Special-Status Species

Special-status species are defined in this EA to include Federally and state-listed threatened or endangered species, species proposed for Federal listing as threatened or endangered, and Federal candidate species.

On June 27, 2003, the U.S. Fish and Wildlife Service (USFWS) provided an updated list of Endangered and Threatened Species That May Occur in or Be Affected by Projects in Shasta County (USFWS 2000a; Reference file No. 00-SP-2414) (Appendix D). A total of 13 Federal special-status wildlife and plant species and critical habitats for 17 species were identified.

Search results from the California Department of Fish and Game (CDFG) California Natural Diversity Database (CDFG 2003), and the CDFG list of Endangered and Threatened Animals of California (CDFG 2002) resulted in the inclusion of seven California special-status plant and wildlife species that could potentially occur in the portions of Shasta County covered by this EA. Query results from the California Native Plant Society (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants (Skinner and Pavlick 1994) resulted in the inclusion of two California special-status plant species that could potentially occur in the Shasta County study area.

Appendix D lists the state and Federally listed species and critical habitats that could occur in Shasta County and that are considered in the analysis in this EA. The general habitat association for each species is also included in the appendix.

District water conservation plans have been prepared by the BVWD (January 1995), CCCSD (November 1994), City of Redding (undated, assume 1994), and City of Shasta Lake (March 1994). The district water

conservation plans were reviewed to ensure that listed plant and wildlife species identified by the districts were included in this analysis. The following species do not require further consideration in this EA for the reasons specified below:

Western yellow-billed cuckoo – The western yellow-billed cuckoo was historically common throughout the Central Valley and other lowland areas. It is now uncommon to rare in scattered locations throughout California (Zeiner and Laudenslayer et al. 1990). There are no recently reported observations of the western yellow-billed cuckoo in the project study area.

California red-legged frog – The historic range of the California red-legged frog extended into the Redding Basin, but the frog is believed to be locally extirpated. There have been no reported observations in the project area since 1925 (Jennings and Hayes 1994).

Shasta crayfish – the Shasta crayfish occurs only in streams in the Pit River, Fall River, and Hat Creek drainages. There are no known sightings of the Shasta crayfish in the project study area.

According to CFDG literature, there are no identified deer migration corridors, fall holding areas, fawning grounds, or critical winter range within the study area (Shasta County DRM 1998). However, deer are known to use all of the habitats described above.

4.5.2 ENVIRONMENTAL CONSEQUENCES

The incremental and cumulative effects of Alternatives 1 and 2 on biological resources are compared to the No Action Alternative.

No Action Alternative

Because renewal of the long-term contracts would not involve the construction of any physical facilities and structures, implementation of the No Action Alternative would not have direct effects on biological resources.

In Shasta County, long-term contract renewal would not be the sole or primary factor influencing changes to biological resources. Counties and cities can encourage or discourage changes to biological resources/habitats by approving or conditioning subdivisions and industrial developments within their jurisdictions. When a city or the County approves land use changes in a General Plan or specific plan, effects on biological resources and other resources must be addressed under the California Environmental Quality Act. These decisions occur independently of Reclamation's authorities and responsibilities. Similarly, a farmer who elects to cultivate one crop over another, or to fallow a parcel of land, may do so without Reclamation approval. However, Reclamation is required to analyze biological effects under the National Environmental Policy Act when Reclamation approves an expansion or a reduction of the service area boundary, or directs a change in water use or development.

Renewal of the long term contracts under the No Action Alternative is unlikely to result in incremental indirect effects to biological resources and habitats on parcels receiving M&I water. However, indirect effects on biological resources could occur in the two districts that are designated for CVP agricultural water use: BVWD and CCCSD. Under the No Action Alternative, contracts would increase the

minimum parcel size eligible to receive water at the lower irrigation rates; parcels less than or equal to 5 acres would receive water at M&I rates (not agricultural rates) unless Reclamation is satisfied that the water use is for commercial agricultural purposes. All water currently deemed commercial agricultural irrigation is expected to qualify as agricultural water under the No Action Alternative.

In 1996, a total of 7,319 acres within the BVWD and the CCCSD were designated for CVP agricultural water use and were irrigated with CVP water: 3,388 acres in the BVWD and 3,931 acres in the CCCSD. Under the No Action Alternative (2029 projection) for the BVWD, the irrigated acreage is assumed to increase to 5,960 acres and 5,890 acres for the average and dry conditions, respectively, per the predictions of the districts. Under the No Action Alternative (2029 projection) for the CCCSD, the irrigated acreage is assumed to increase to 4,690 acres and 4,640 acres for the average and dry conditions, respectively. (See also Table 4.3-17.) This indirect effect may have a beneficial or adverse effect on biological resources, depending on the specific parcels, habitats, and species under consideration. Reclamation is consulting with fish and wildlife agencies (Federal and state) regarding this indirect effect.

Alternative 1

Alternative 1 is assumed to have direct and indirect effects on biological resources similar to those of the No Action Alternative. Land use changes are anticipated over the next 25 years. However, the effects of Alternative 1 on agricultural water costs and associated land and water use are expected to be the same as the No Action Alternative. There would be no incremental direct or indirect environmental effects on biological resources under this alternative.

Alternative 2

Alternative 2 is assumed to have direct effects on biological resources similar to those of the No Action Alternative. There would be no incremental direct environmental effects on land use under this alternative.

Regarding indirect effects, Alternative 2 could cause a slight retraction of the regional economy and a consequent effect on M&I land use. A retraction of the regional economy would be expected to delay implementation of or reduce the scale of land uses that rely on M&I water deliveries, which is assumed to be a beneficial effect on biological resources. Regional economic impacts are expected to be small compared to the normal inter-year variation, so the beneficial effects on biological resources are expected to be small. Otherwise, Alternative 2 is assumed to have indirect effects on biological resources occurring on lands receiving M&I water similar the No Action Alternative. There are no other incremental indirect effects on biological resources occurring on lands receiving M&I water under this alternative.

Under Alternative 2, indirect effects to biological resources may occur on agricultural parcels due to redefining the parcel size eligible to receive water at the lower irrigation rate. Indirect effects are expected to be similar to those anticipated under the No Action Alternative. There are no incremental indirect effects due to rewording under this alternative.

For Contractors that deliver agricultural water (i.e., BVWD and CCCSD), substantial fallowing of lands may occur with implementation of Alternative 2 relative to the No Action Alternative. Almost all of the additional fallowed lands are projected to be taken out of pasture. The incremental acreage that may be

fallowed in 2029 under Alternative 2 versus the No Action Alternative are presented for the BVWD (average and dry conditions) in Table 4.3-19. These projections are presented for the CCCSD in Table 4.3-20.

As shown in Table 4.3-19, for the BVWD, implementation of Alternative 2 could result in increased fallowing (relative to the No Action Alternative) of about 800 acres in 2029 under average conditions and could result in increased fallowing of about 1,160 acres under dry conditions. These values represent 13 percent and 20 percent reductions, respectively, in the irrigated acreages that are assumed to occur under the No Action Alternative in average and dry conditions.

As shown in Table 4.3-20, for the CCCSD, implementation of Alternative 2 could result in increased fallowing (relative to the No Action Alternative) of about 510 acres in 2029 under average conditions and could result in increased fallowing of about 740 acres under dry conditions. These values represent 11 percent and 16 percent reductions, respectively, in the irrigated acreages that are assumed to occur under the No Action Alternative in average and dry conditions. Relative to the entire Trinity River Division, this reduction in irrigated acreage is considered a minor effect.

Increased fallowing may have variable indirect effects on biological resources. These indirect effects may be beneficial or adverse, depending on the specific parcels, habitats, and species under consideration.

Because of the inability to predict where the impacts of the proposed action will occur and the complexity of habitat use patterns by various wildlife species, only a limited number of general predictions can be made regarding the indirect effects of the increased acreage threshold (from 2 to 5 acres):

- In general, decreased irrigation of personal orchards/agricultural plots between 2 and 5 acres in size could indirectly benefit special status-species if the changes to land use result in improved water quality of run-off entering vernal features, drainages, streams, and rivers. Beneficial impacts to Federally listed, proposed, and candidate species could also occur if newly non-irrigated lands were allowed to remain in their natural condition or allowed to lie fallow.

- Decreased irrigation of certain parcels could result in slightly less water entering drainages and intermittent/perennial streams in summer months, which could adversely affect species such as Central Valley steelhead or spring-run chinook salmon that rely on Central Valley rivers and tributaries for a portion of their life cycle, but the effect is expected to be small since this run-off increment may be too warm to be very useful to salmon species.

- Increased subdivision of parcels resulting from the potential increased cost of CVP water could result in increased development and loss of habitat and subsequent impacts to Federally listed, proposed, or candidate species occupying those habitats. In addition, urban and other developed habitats generally receive high levels of human use, which disturb native species and restrict their use of the area (Reclamation 1997). However, if the change is from commercial pasture to recreational pasture for pet horses, the effects would be negligible.

Such potential land use actions will require separate determinations regarding potential effects on threatened and endangered species and critical habitat pursuant to Section 7 and/or Section 10 of the ESA.

Conversions from agricultural to M&I land use would not be caused by the terms of the renewal contract, nor by actions of the Contractors that have no land use planning jurisdiction. Instead, such changes will be the result of land use planning decisions of local regulating authorities. Any impacts or "take" associated with such changes would typically be the responsibility of the local CEQA lead agency.

4.5.3 CUMULATIVE EFFECTS

Alternatives 1 and 2 would not result in any cumulative direct effects to biological resources because there would be no infrastructure changes or physical disturbances due to changes in water purchasing by a water Contractor.

4.6 ENVIRONMENTAL JUSTICE

As mandated by Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," published February 11, 1994, this document addresses potential environmental justice concerns related to the long-term renewal of water contracts between Reclamation and the Shasta and Trinity River Divisions' Contractors. The Executive Order requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

In August 1994, the Secretary of the Interior issued an environmental justice policy statement directing departmental action, resulting in Interior's *Strategic Plan for Environmental Justice.* Reclamation's decision-making process includes public involvement, Indian trust assets consultation, and coordination with potentially affected members of the public.

Renewal of the long-term water service contracts is not expected to disproportionately affect minority populations or low-income populations. Minority populations constitute about 10 percent of the population of Shasta County (California Department of Finance 2000), and are mainly in urban centers, which are less sensitive to price changes than agricultural users. Additionally, the proposed contract terms and provisions would not involve the construction of new facilities, cause the relocation of any populations, result in any known health hazards, cause the generation of any hazardous wastes, result in any property takings, or generate any substantial economic impacts.

The proposed long-term water service contract renewals would not have an adverse effect on human health or the environment, as defined by environmental justice policies and directives. Rather, renewal of the contracts would provide a long-term water supply that would meet the projected water demand and need, which have been previously been documented in the Shasta County General Plan and the general plans of affected cities.

4.7 INDIAN TRUST ASSETS

4.7.1 AFFECTED ENVIRONMENT

Indian trust assets are legal interests in property that are held in trust by the U.S. Government for Indian tribes or individuals. The Secretary of the Interior is the trustee for the United States on behalf of recognized Indian tribes. Examples of Trust assets are lands, minerals, hunting and fishing rights, and water rights.

Reclamation shares the responsibility to protect and maintain Indian Trust assets reserved by or granted to Indian Tribes or Indian individuals by treaty, statute, or Executive Order. Reclamation carries out its activities in a manner that protects trust assets and avoids impacts, where possible. Where not possible, compensation or mitigation is provided in consultation with affected Tribes.

There are no known federally recognized Indian trust assets within the contract service areas of the Shasta and Trinity River Divisions that would be affected, other than the Redding Rancheria, which receives M&I water from the City of Redding. The Redding Rancheria is located outside of the Buckeye Contract service area.

4.7.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

There would be no environmental effects to Indian trust assets under the No Action Alternative.

Alternative 1

There would be no environmental effects to Indian trust assets under Alternative 1.

Alternative 2

There would be no environmental effects to Indian trust assets under Alternative 2. Effects to the Redding Rancheria would be the same as those experienced by residents of the City of Redding.

4.7.3 CUMULATIVE EFFECTS

Implementation of Alternative 1 or Alternative 2 would not affect Indian Trust assets and would therefore not contribute to cumulative effects to those assets

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4.8 CULTURAL RESOURCES

This section describes the cultural resources in the area of the 10 water service Contractors in the Shasta and Trinity River Divisions. The service area boundaries of these Contractors fall within one of the following: an unincorporated area of Shasta County, the limits of the City of Redding, or the limits of the City of Shasta Lake.

4.8.1 AFFECTED ENVIRONMENT

Prehistory

A paper presented by Elaine Sundahl (1992) provides the best existing overview of the prehistoric period within the study area. Although the field work completed and reported by Sundahl in this paper is more wide ranging, the paper accurately describes the prehistoric record within the study area.

The earliest defensibly dated cultural evidence from the region adjoining the study area comes from archaeological site CA-SHA-475 on the Squaw Creek drainage of Shasta Lake. Radiocarbon dates from the lowest stratum indicate human use dating between 6,530 and 7,580 years ago (Sundahl, 1992:99). Material in this layer represent the Borax Lake Pattern as described by Fredrickson (1973). This cultural tradition is also described in general texts (Chartkoff & Chartkoff, 1984:109; Moratto, 1984:82) as containing relatively large widestem points typically fashioned from Grasshopper Flat/Lost Iron Wells obsidian or local silicate materials and unshaped milling tools. This period, lasting until about 5,000 years ago, was likely typified by a foraging economy based on extensive hunting and the collection of native plants, especially hard seeds. This pattern is thought to be linked to Hokan-speaking people, quite possibly the ancestors of the Yana.

During the period between approximately 5,000 and 3,000 years ago, the tool kit of aboriginal inhabitants changed. This later pattern is termed the Squaw Creek Pattern, again based on Sundahl's work north of Shasta Lake. Contracting stem points, uniface points, and leaf-shaped points appear. These projectile points increasingly are made from Tuscan Source obsidian. Milling tools are evidenced by the addition of mortars and pestles. Hand stones (manos) used on mill stones (metates) are often extensively shaped in contrast to the earlier pattern. The use of mortars suggests an increased reliance on acorns and, perhaps, other softer foods. Evidence of this pattern is more widespread, which could be a factor of preservation or increasing human use.

The period between approximately 3,000 and 1,700 years ago is termed the Whiskeytown Pattern by Sundahl. It is typified by "...large and medium-sized corner-notched and side-notched points, manos, millingstones, and notched-pebble net weights" (Sundahl, 1992:103). Many sites in the Redding vicinity include clear evidence of this pattern. Although the foraging tradition of earlier patterns continued, an increased reliance on riverine resources is suggested by the location of the sites and the inclusion of the net weights.

The last period has long been described as the Shasta Complex (Meighan, 1955). However, Sundahl (1992:104) follows Fredrickson by terming this well-known period as the Augustine Pattern. During the last 1,500 years or so, the aboriginal inhabitants diversified and specialized in the exploitation of natural resources. Smaller barbed projectile points and shaft smoothers mark the appearance and increased use of

the bow and arrow. Specialization led to increased sedentism with relatively large seasonal encampments along the major streams and, especially, at their confluences within the study area. Bone fishing implements and the appearance of substantial quantities of shell and fish bone suggest a riverine-based economy. This cultural pattern is related to the appearance of Penutian speaking people from the Columbia Plateau. These people are assumed to be the ancestors of the modern Wintu.

Ethnography

Prior to appearance of Euro-American explorers and settlers, the study area was populated by the Wintu and Yana. The Wintu occupied all of the study area except the Cow Creek drainage, which fell on the northwestern edge of the Yana (Johnson, 1978:361). The Yana spoke a Hokan dialect (Shipley, 1978:86) whereas the Wintu spoke a Penutian language (Shipley, 1978:82,83). These languages were from different linguistic families.

In addition to the vast language differences, the two peoples occupied somewhat different environments. The Wintu appear to have spread rapidly and to have controlled the Sacramento River corridor and many of its most productive tributaries. The Yana were relegated to the eastern foothills and stream corridors of the southern Cascade.

The material culture and lifestyles of the two groups were, however, quite similar (DuBois, 1935; Johnson, 1978; LaPena, 1978; Sundahl, 1992:90). They both constructed semipermanent or permanent villages on the terraces above main stream corridors and emphasized the use of fish (especially salmon), shellfish, acorns, and other native plant foods. These staples were processed to provide food during the winter and other lean periods. Reliance on a variety of foods lessened the possibility of famine resulting from the failure of one or more food sources. Hunting augmented the staples of the diet (Sundahl, 1992:90). Skins acquired through the hunting or snaring of animals were processed and used for a variety of items, especially clothing. Housing consisted of conical, semi-subterranean family residences. These small structures (approximately 10 feet in diameter) often were located near a larger communal structure that was used variously as a residence and for ceremonies (LaPena, 1978:325,326; Johnson, 1978:367). The size of these communal structures appears to have increased through time.

History

The history of the greater Redding area revolves around mining, ranching, farming, lumbering, transportation, and tourism. The relative importance of these economic pursuits varied by place and time. However, they continue to play some role within the economy of the study area even today. Therefore, the following discussion is organized chronologically, with a brief discussion of the relative importance of these or other significant activities as derived from Petersen (1965).

Although the renowned trapper Jedediah Strong Smith is generally credited with the earliest (1828) Euro-American exploration through Shasta County, his party crossed only the far southwestern corner of Shasta County, well away from the study area. Other trappers crossed the area in hopes of claiming furs and land for Britain or the United States. These forays were upsetting to the Mexican government, which, although it had no presence within the study area during this early period, claimed sovereignty. Alexander McLeod (~~1929~~ 1829), Peter Ogden (1830), and John Work (1832) all represented the interests

of the Hudson Bay Company. Ewing Young was the first American (1832) known to actually cross the study area.

In response to these activities, the Mexican government pressed their sovereignty within the Sacramento Valley by providing land grants to Mexican citizens. Many of these citizens were American or European settlers. The most significant of these new land claimants within the study area was Pierson B. Reading, who was granted the 26,633-acre Buena Ventura land grant in 1844. The grant stretched along the west side of the Sacramento River from Salt Creek in the north to Cottonwood Creek in the south. Although his permanent abode and successful farming operation were located between the lower reaches of Anderson and Cottonwood Creeks, his actions would have significant effects on developments within and adjoining the study area.

Reading played a major role in the Bear Flag Revolt of 1846, which paved the way for American claims to California and the Mexican-American War of 1846-1847. Subsequent to the Mexican cession of California to the United States of America, gold was discovered in 1848 at Sutter's Mill, leading to the California gold rush. Pierson B. Reading was soon involved in the frenzy. He led parties to the second gold strike in California at Reading Bar on Clear Creek, which adjoins the study area, as well as to other discoveries of gold at Reading Bar on the Trinity River and Reading Springs (Old Shasta). These discoveries were the major impetus for the claiming, settlement, and subsequent development of Shasta and Trinity Counties. Within the study area, placer mining and, eventually, hard rock mining fueled the economy. Although mining activities did not occur in the eastern portion of the study area, ranching and farming activities were undertaken to support and profit from the mining communities. Mining flourished throughout the 1850s and 1860s, with individual operations giving way to corporate undertakings.

In 1872, the Central Pacific Railroad reached the new settlement of Redding, which was named after the railroad land agent B. B. Redding. Redding served as the railroad's terminus until 1883, when the route was pushed northward along the Sacramento River canyon. The quick development of Redding led to the demise of Shasta, which served as the county seat from 1851 until 1888. With local mining revenues gone, Shasta soon became a town "gone bust." Large hydraulic mining operations, including those within the study area, ceased in compliance with State law in 1884. Citizens residing in the study area increasingly depended on farming, ranching, and the railroad as the underpinnings of the economy. Happy Valley was the only irrigated area in the early 1880s. Produce grown as a result of this irrigation led to the Valley's settlement and development. Although other areas did not yet benefit from sizeable irrigation projects, extensive agriculture, livestock grazing, dairying, and manufacturing continued to support a growing population.

In the latter part of the nineteenth and early part of the twentieth centuries, large-scale mining returned with the extraction and smelting of copper from a belt running from Keswick upstream along the Sacramento and Pit Rivers to Bully Hill outside of the study area. By the conclusion of World War I, this industry had dwindled. The smelting activities laid ruin to a vast acreage of vegetation, including fruit trees as far away as Happy Valley and Anderson. Local manufacturing (e.g., Terry Lumber Company in Bella Vista and gold dredging along Clear Creek) profited during this copper heyday. All of these undertakings were made possible by the railroad. The study area headed into an economic decline during the 1920s and 1930s after the bust of the copper industry. Redding even lost population during this period.

With the construction of Shasta Dam in the late 1930s and early 1940s, the economy and population began an upward trend. Lumber mills were built within and, especially, south of the City of Redding following World War II to support development in California. Sand and gravel mining supplanted ore extraction within the study area. The completion of State Highway 99 in the 1920s augmented the shipping and transportation services of the railroad. With the proliferation of the automobile, the area became a destination for tourism and recreation.

Identified Cultural Resources

Table 4.8-1 lists the cultural resources identified within or adjacent to the service area boundaries of the Shasta and Trinity River Divisions.

TABLE 4.8-1
CULTURAL RESOURCES IN THE SHASTA AND TRINITY RIVER DIVISIONS AREA[1]

Name of Cultural Resource	General Location	Theme[2]
Bass Hill	North of Redding	EX/SE
Bells Bridge	Highway 99, Clear Creek	EX/SE
Benton Tract Site*	Redding	CULT
Briggsville	Clear Creek Road	EC/IN
California-Oregon Road	Anderson	EX/SE
Clear Creek	Redding	EC/IN
Cow Creek Petroglyphs	**	CULT
Horse Town	Clear Creek Road	EC/IN
Millville	Old 44 Drive	EC/IN
Old City Hall*	Redding	SO/ED
Olsen Petroglyphs	**	CULT
Pine Street School*	Redding	SO/ED
Pioneer Baby's Grave	West of Shasta	EX/SE
Ried Mine in Old Diggins	Summit City	EC/IN
Shasta State Historic Park	Highway 299, west of Redding	EC/IN
Shasta 47	Sacramento River - Redding	CULT
Texas Springs	Texas Springs Road	EC/IN

Source: State of California Department of Parks and Recreation

[1] The heritage resources listed here include resources listed in the National Register of Historic Places, the California Historical landmarks series, or the California Points of Interest program. In addition to the resources listed, there are approximately 500 known sites or areas of archaeological significance. The names and locations of these areas are not revealed in order to protect these sensitive resources. This information is on file with the Cultural Resources Section of the California Department of Parks and Recreation.

[2] Theme Code:

ARCH	Architecture	EX/SE	Exploration/Settlement	MIL	Military
CULT	Cultural (Aboriginal)	EC/IN	Economic/Industrial	REL	Religion
SO/ED	Social/Education				

* National Register of Historic Places site

** Information regarding the location of these resources is on file with the Cultural Resources Section of the California of Parks and Recreation

4.8.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

The No Action Alternative would introduce no new facilities, no new construction activities, or no direct effects to the physical environment, and would therefore not result in any direct effects to cultural resources. Indirect effects to cultural resources due to planned growth and development within the unincorporated portions of Shasta County or within the City of Redding (Buckeye area) or City of Shasta Lake would be expected to occur over the next 25 years. Generally, such changes in land use are predicted to occur throughout Shasta County, independent of the long-term contract renewals, as the area transitions from a rural economy to a more suburban economy.

Under the No Action Alternative, indirect impacts could occur if property owners elect to change the use of their lands from agricultural uses to suburban or urban uses, or from suburban uses to agricultural uses. These changes in land use could affect both known and undiscovered cultural resources. Where sensitive cultural resources occur, both Federal and state jurisdictions provide programs to protect sensitive cultural resources.

For non-Federal actions, such as changes to a county or city general plan or the approval of a use permit, a lead agency under the California Environmental Quality Act (CEQA) would be the responsible decision maker, and impacts on cultural resources would be evaluated pursuant to CEQA. If a Federal action is proposed, such as changes to the CVP service area boundary, a Federal lead agency would be responsible for compliance under NEPA and Section 106 of the National Historic Preservation Act.

Alternative 1

Under Alternative 1, CVP operations and facilities would not be altered and impacts are expected to be identical to the No Action Alternative. Therefore, no incremental environmental effects from this alternative are expected.

Alternative 2

Under Alternative 2, effects to cultural resources would be the same as under the No Action Alternative. Therefore, no incremental environmental effects from this alternative are expected.

4.8.3 CUMULATIVE EFFECTS

Demographic, economic, political, and other factors, independent of implementation of Alternatives 1 or 2, are causing changes with direct and indirect effects to cultural resources that are beyond the range of Reclamation's Section 106 responsibilities. The effects of Alternatives 1 and 2 on cultural resources are expected to be the same as the likely effects of the No Action Alternative. Therefore, the incremental effects to cultural resources due to the approval and conditions of the long-term contract renewal change between the No Action Alternative and Alternatives 1 and 2 is expected to be minor. The proposed action (approval of long -term contract renewals) is not expected to contribute to cumulative impacts to cultural resources.

4.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA Section 102(C)(v) requires federal agencies to consider to the fullest extent possible any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. The proposed action is the renewal of existing contracts and does not involve construction or the use of resources except water. There is no other commitment of nonrenewable resources, and the proposed action does not commit future generations to permanent use of natural resources.

4.10 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA Section 102(c)(iv) requires all federal agencies to disclose the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. These water delivery contracts are temporary (25 or 40 years), yet result in long-term benefits to the human environment in the Central Valley. Long-term productivity would be enhanced through the water supply that sustains agricultural economics, social benefits, and the long-term productivity of urban and rural populations by providing CVP water.